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New Zealand Geographer

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THE RELATIONS OF NEW ZEALAND WEATHER AND CLIMATE:

AN ANALYSIS OF THE WESTERLIES

IAN E. M. WATTS

ACROSS northern New Zealand and the North Tasman Sea there is said to exist an extensive belt of relatively high pressure centred between latitudes thirty-five and forty degrees south, and extending from latitude thirty to forty-five. North of this belt is the southeasterly flow of trade winds to the tropics, while along the southern fringe are the strong westerlies of the 'roaring forties'. For many years climatologists were content to assume that this westerly current governed New Zealand weather, maintaining the cloud cover and the heavy rainfall on the west coast, and allowing better conditions to the east of the main ranges. To a certain extent this premise is justified, for it well explains certain features of the New Zealand climate.

Unfortunately, however, a considerable range of climatological data cannot be explained wholly on this basis. Admittedly, rainfall over the South Island would appear to be a product of the westerly flow; 200 inches or more[1] are deposited annually along the western slopes of the Alps, and a mean 150 inches over the lower coastal stretch of Westland. These falls are certainly vastly greater than the 15 inches of Central Otago, or than Canterbury's 25 inches, or than the 40 to 50 inches experienced in Invercargill and the eastern alpine region.

There is no such sharp division between western and eastern districts of the North Island. Annual rainfall is greater than 80 inches in the hill country between Egmont and Hamilton, over the Kaimai and Tararua Ranges and in the hills north of Dargaville. These areas have in general a westerly exposure. But it is disconcerting to find that there is another area of heavy rainfall (greater than 80 inches): this covers the higher land extending from East Cape for over one hundred miles to the southwest, with an extension eastward of Tiniroto. There is no question of westerly exposure here. Rainfall over most of the eastern lowlands is from 40 to 60 inches. Leeward sheltering is possibly indicated by an area between Napier and Waipukurau where a rainfall of as much as 40 inches a year is a rare occurrence. The Manawatu, however, happens to be an equally dry region.

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[1] E. Kidson: *The Annual Variation of Rainfall in New Zealand (for the period* 1891 *to* 1925), Meteorological Office, Wellington, 1930.

The westerlies, then, constitute a rather unsound basis upon which to rest an explanation of North Island climatology, and it appears that closer analysis of the prevailing flow is justified.

New Zealand Weather Series

Individual daily analyses prove that the subtropical high pressure belt is far from continuous, and that it consists of a series of semi-permanent anticyclones moving in slow procession to the east-northeast. Approximately one member of this series passes any point on the track each week. Each anticyclonic cell brings fine weather, calms and winter frosts within its radius of influence; and winds freshen on the margins of the system into a vigorous counterclockwise circulation, the southernmost sector of which merges into the westerlies of the 'forties'.

Between each pair of anticyclones there is a trough of low pressure which frequently contains the low cloud and rain of a cold front, and which is accompanied by a wind change from northwest to west, southwest, south or southeast. As an anticyclone moves off to the east of New Zealand, northwesterlies gradually freshen and orographic cloud forms at once to the west of the Southern Alps (*Fig.* 1). This cloud gradually extends northwards over western districts, as the northwesterlies become general, and rain may develop (*Fig.* 5). Eastern districts are unaffected. If the northwesterly current is very dry, as it sometimes is in its initial stages, condensation takes place only at a considerable height as the current rises. The resultant orographic cloud has its genesis in a lenticular cap above the mountain tops (*Fig.* 2). This rarely persists, for as the current becomes moister as a result of its passage over the sea, the cap is replaced by the more normal types of low cloud.

Frontal rain (and nearly all our rain is frontal or orographic) may fall on both coasts, but the location of the maximum falls is dependent on the direction of flow in the cold air following the front[2]. If this flow is

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[2] I. E. M. Watts: 'Forecasting New Zealand Weather', *N.Z. Geographer*, Vol. 1, No. 2, Oct. 1945, pp. 119-128.

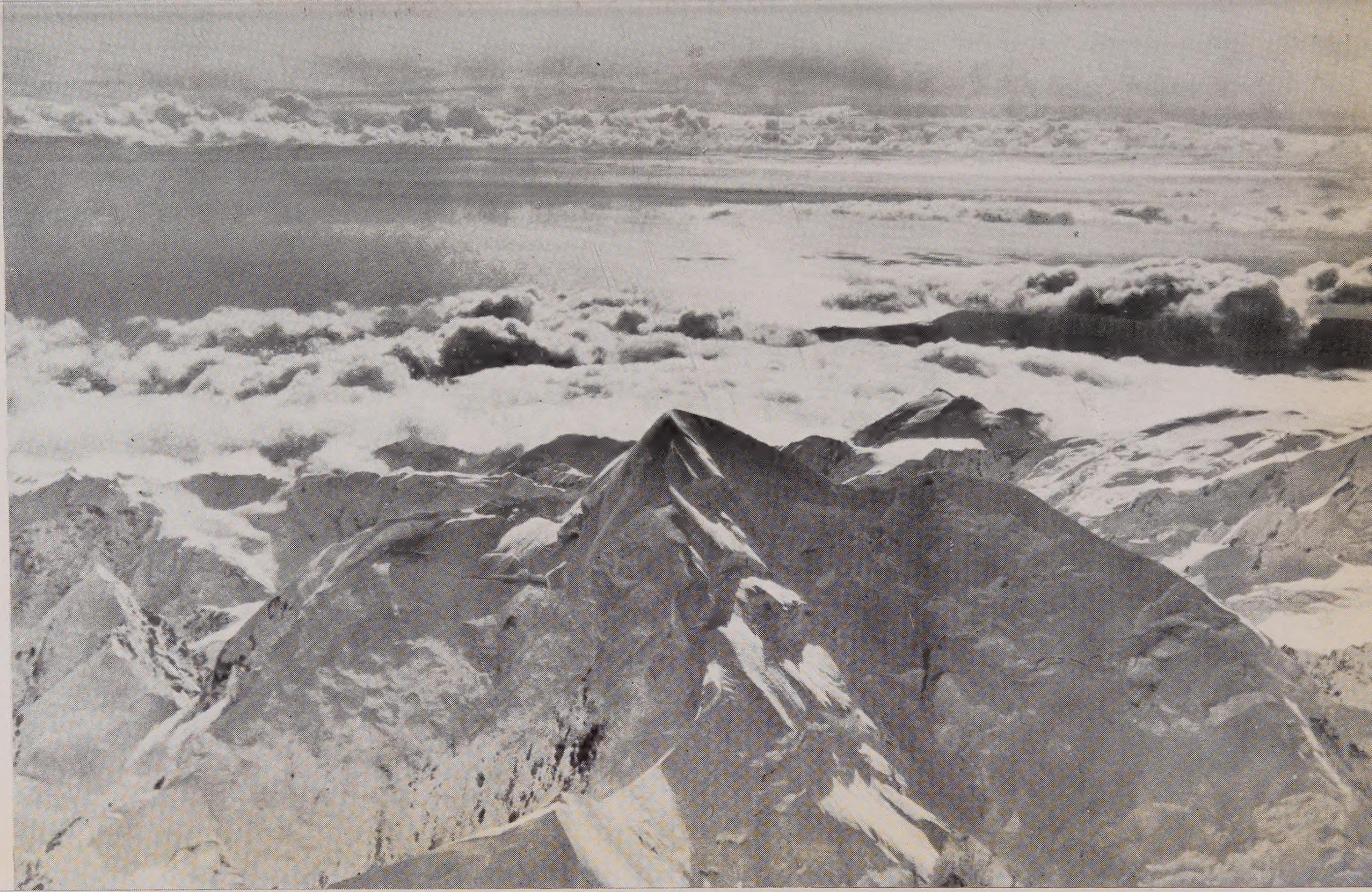

Fig. 1. 'Orographic cloud forms at once to the west of the Southern Alps.' (Looking westward from the head of the Tasman Glacier.)

Photo: R.N.Z.A.F.

northwesterly, westerly or southwesterly, precipitation is largely confined to western districts, and there is little effect on the east coast; but if the following flow is from the south or southeast, the eastern provinces may receive quite heavy falls during this later stage of the process.

The climate is, then, a synthesis of the effects of a number of series each consisting of four components—anticyclone, northwesterlies, frontal weather, and the conditions associated with the following flow, the direction of which determines the distribution of rain and cloud as between the west and east coasts. The sequence is frequently complicated by the formation of depressions in the trough;[3] but this does not normally bring about a discrimination as to the exposed coast, since precipitation is distributed more or less evenly over all sections of a depression.

TABLE I

Percentage of Days Under Various Controlling Influences

Controlling Factor	North of New Plymouth and Napier	Central Region	South of Farewell Spit and Cape Campbell
Anticyclones and light winds	28	19	20
Moderate northwesterly to northerly	9	9	8
Strong northwesterly	3	11	7
Moist northerly . .	5	4	3
Moist northeasterly or easterly	6	4	5
Cold front	5	6	10
Southwesterly after cold front . .	11	9	11
Southerly after cold front	3	7	8
East to southeasterly after cold front . .	2	8	7
Westerly after cold front	4	4	4
Northwesterly after cold front . .	1	1	1
Warm front or stationary front . .	3	3	3
Depressions	6	6	6
Currents Not Associated with Regular Series:			
Light to strong southwesterly to westerly currents . .	11	7	6
Light to strong southerly to easterly currents	3	2	1

Table I shows the percentage of days per year during which each

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[3] *ibid.*

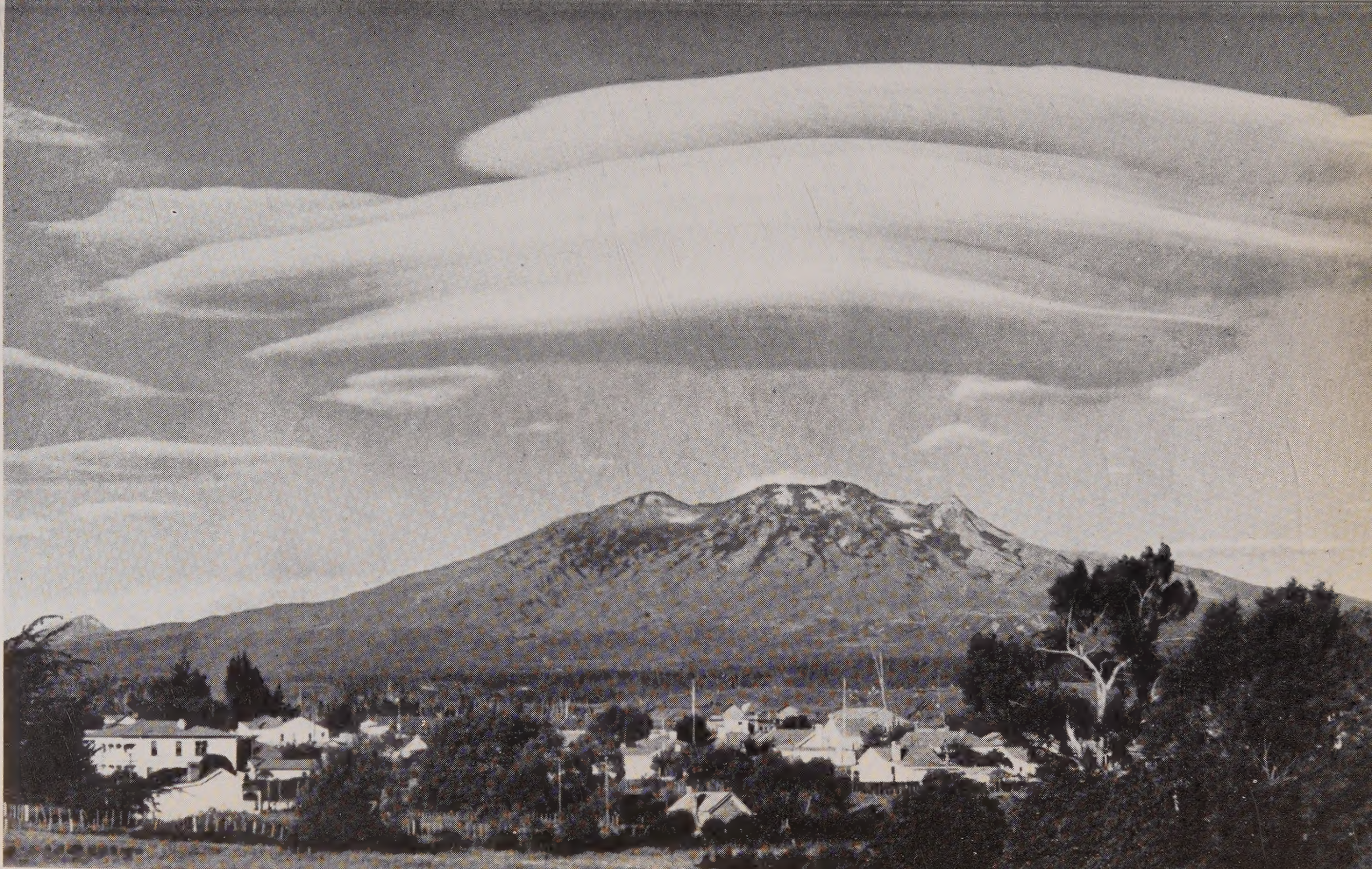


Fig. 2. 'A lenticular cap above the mountain-top'. (Mt. Ruapehu from Raetihi.)

Photo:
N. Mosen, Raetihi.

stage of the series controls the weather conditions. It has been convenient to divide the Dominion into three regions since the entire country, extending over twelve degrees of latitude, is rarely at one time under the exclusive influence of one control. The tremendous funnel effect of Cook Strait also greatly influences the weather systems themselves over the central region. The tabulation is based on the 6 a.m. chart each day over the period July 1943 to June 1946.

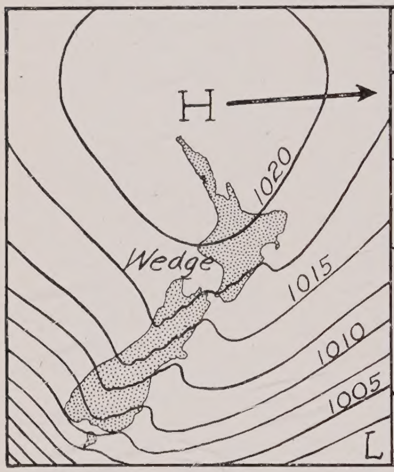


Fig. 3. A Wedge in the Southern Sector of an anticyclone.

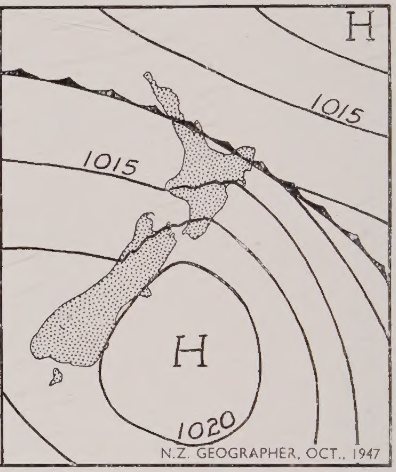


Fig. 4. A 'cold anticyclone' following a cold front.

As might be expected there are many fewer occasions of anticyclonic control over the central region than in the far north. The main east-west axes of the highs usually spend two or three days travelling across Auckland, while the less extensive 'wedge' in the southern sector of the anticyclone (*Fig.* 3) rarely takes more than one or two days to traverse the country. It is surprising that there is not a still further decrease in the frequency of anticyclonic control in the far south; a high percentage of anticyclones is maintained over the South Island by the occasional formation of 'cold anticyclones' in the cold air following any front with a southeasterly wind change (*Fig.* 4). The Cook Strait area, on the other hand, does not benefit from a summation of these two classes of highs, as too often the necessity for the maintenance of an escape funnel through the straits keeps the highs to the north or south of central New Zealand. So the control is anticyclonic for twenty-eight percent of the year in the north, but for only nineteen and twenty percent over the central and southern provinces respectively.

FRONTAL WEATHER

It will be noted that there are ten days of cold front weather per hundred over the South Island, but only five such days in the North. It is well known that cold fronts move more slowly as they travel northwards. They might thus be expected to spend a greater time over the northern region; but the deficit is simply explained by the fact that approximately half the fronts that cross Southland weaken or finally dissipate before they reach Wellington.

Nine to eleven days in each hundred throughout the entire country are days of cold southwesterly air following a front. Few cold air showers, however, are able to reach the east coast. Even the frontal rain itself is lacking there because the front dissipates in the sheltered eastern region (*Fig.* 6) and probably reforms when the whole system has crossed New Zealand. As a result such frontal passages (and they occur during nine to eleven percent of our year) maintain in general much the same conditions as would be expected in an undisturbed westerly current. Certain subtle regional changes do occur, however, with this class of front. Of these the most outstanding is the clearing which must ensue over the Marlborough Sounds and the northern Cook Strait areas since this area is sheltered during the southwesterly swing by the bulk of the South Island. Yet in the main, the northwesterly, westerly and southwesterly air components are similar in effect, and Table II which is a summary of Table I, shows that together they constitute the most significant and most frequent controlling influence of New Zealand weather in all three regions.

TABLE II

PERCENTAGE OF DAYS UNDER MAJOR CONTROLLING INFLUENCES

CONTROLLING FACTOR	NORTHERN REGION	CENTRAL REGION	SOUTHERN REGION
Northwesterly, westerly and southwesterly	39	41	37
Southerly to easterly	14	21	21
Anticyclone	28	19	20
Moist northerly	5	4	3
Depressions, warm fronts and stationary fronts	14	15	19

DISTRIBUTION OF SUNSHINE

In other words, about four days in ten are potentially westerly days, and this is amply illustrated in the map of annual sunshine hours

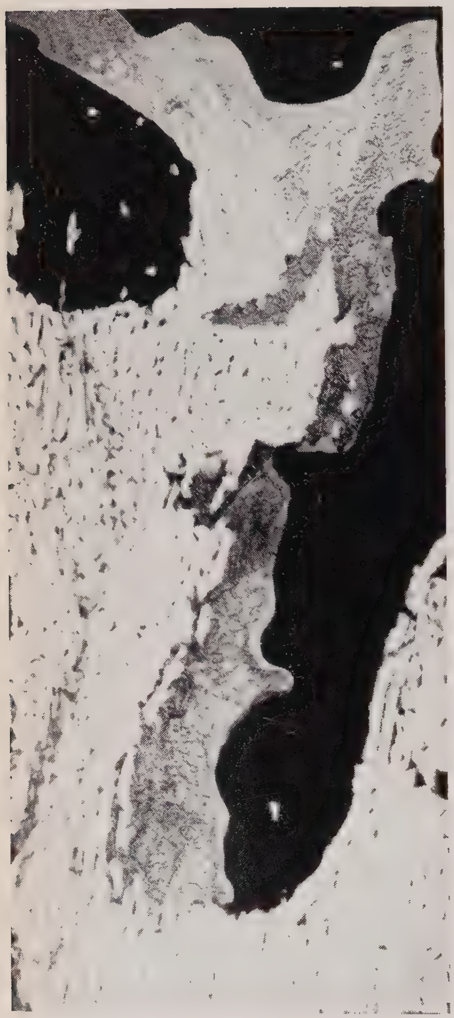


Fig. 5. 'Cloud gradually extends northwards over western districts . . . . as the northwesterlies become general.'

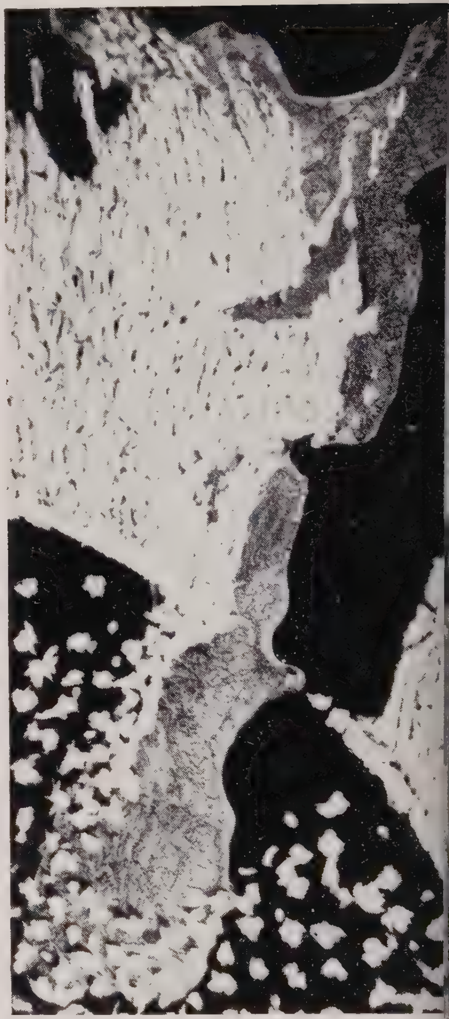
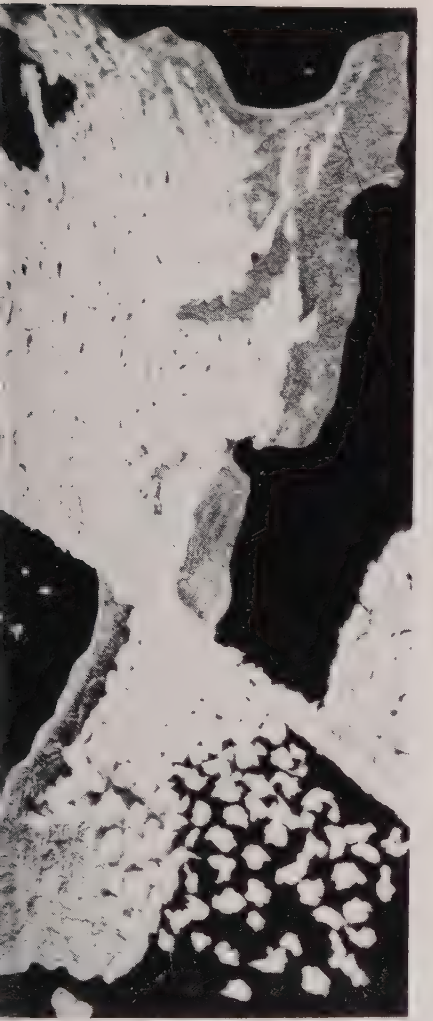


Fig. 6. A cold front followed by southwesterli

(*Fig.* 9). This map, and others following concerning different elements of our climate, were compiled from observations made at from thirty-five to forty-five observing stations of the New Zealand Meteorological Office. The reports used were made during the period 1928 to 1940, and in most cases a ten year average was taken.

Least sunshine is recorded in the far south where orographic cloud first forms in the northwesterlies; there is another minimum from Terawhiti to Tangimoana where convergence of the northwesterly or westerly flow into the funnel of the straits readily produces cloud; still



. A cold front with a southerly or southeasterly ge in the cold air entails a redistribution of cloud from western to eastern districts.

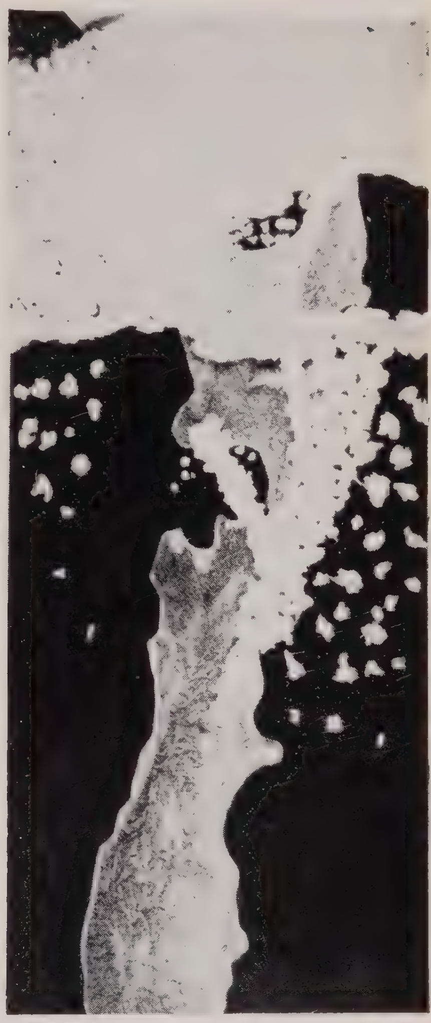


Fig. 8. Cold fronts with a southerly or southeasterly gradient in the cold air dissipate over the land north of Taranaki, but maintain rainfall on the east coast.

another minimum occurs south of Banks Peninsula, but this is due probably to a lowering of the general average by exposure during the not infrequent days of southerly control. Nelson, protected from west, south and east by high ranges, attains 2,500 hours of sunshine per annum, while Blenheim, Tauranga and Napier are almost as fortunate.

The distribution of sunshine hours has an interesting consequence. Disregarding the atmospheric circulations, a gradation of temperature might be expected from north to south, and another from low country to high country. To a certain extent this ideal is realised, but over it all

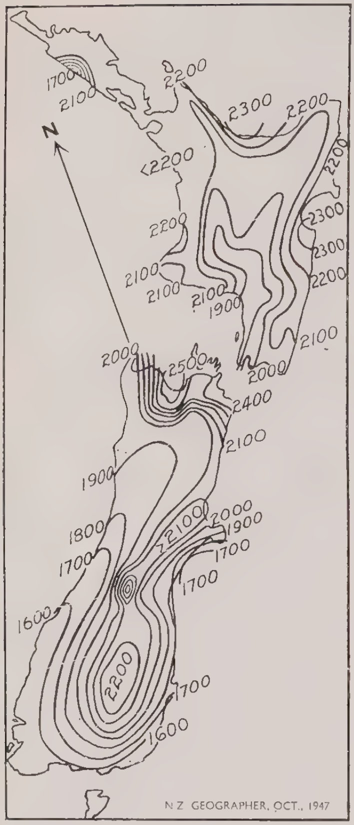


Fig. 9. Hours of sunshine per year.

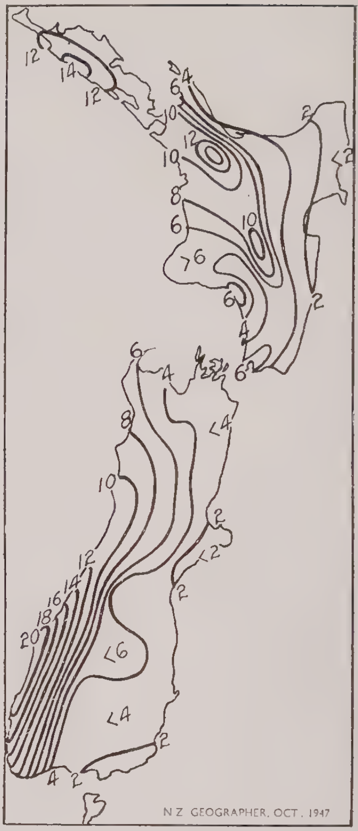


Fig. 10. Number of thunderstorms per year.

is superimposed the effect of sheltering and foehn wind heating. So summer temperatures are unduly high at Napier and in Marlborough (*Fig.* 15). The same large difference is not noticeable in winter, however, as the sheltered districts are then prone to frosts, and low minimum temperatures aid greatly in depressing the mean temperatures. Consequently, although there are only ten to twelve degrees of seasonal temperature range in the Auckland Province, the difference in the frost lands reaches as much as fourteen to twenty degrees.

Four westerly days in each ten are sufficient to exercise a marked control of sunshine and temperature; nevertheless, the days of potential southerly to easterly control are also important. When there is a southerly or southeasterly component in the cold air behind the front, the frontal passage entails a reversal of conditions so that cloud and rain disperse on the west coast and form on the east (*Fig.* 7). Neglecting the

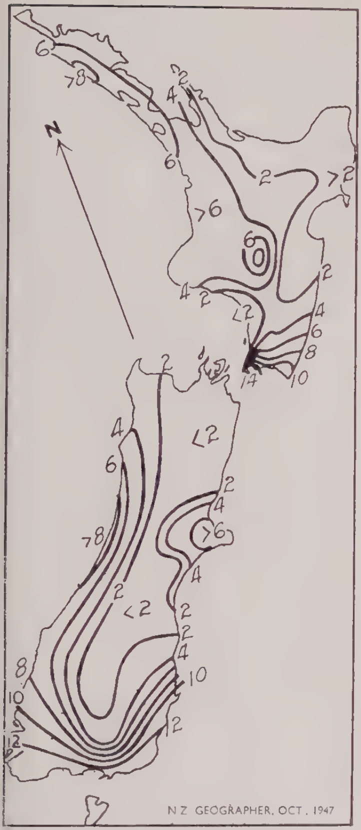


Fig. 11. Number of hailstorms per year.

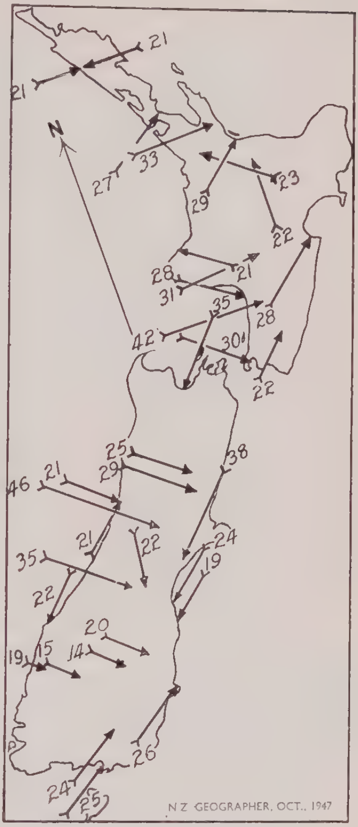


Fig. 12 Most frequent direction at 9 a.m. (per cent.)

more or less general precipitation associated with a depression, it is passages of this southerly or southeasterly nature that account for most of the east coast rainfall.

The southerly or southeasterly flow in the cold air helps to maintain a considerable rainfall in Cook Strait by convergence, and compensates for the lack of precipitation there in southwesterly cold currents. When the front progresses further northward, a convergence tongue with its cloud and showers occasionally forces itself through Cook Strait and across the South Taranaki Bight (*Fig.* 8), but the failure of this southerly precipitation (and also of a great deal of the showers in southwesterly changes) to reach the Manawatu accounts for the low rainfall in that region. Such fronts usually dissipate on the west coast north of Taranaki: but they are slow-moving at this stage and consequently, rainfall is often great in Hawkes Bay, not so heavy perhaps over Napier which is

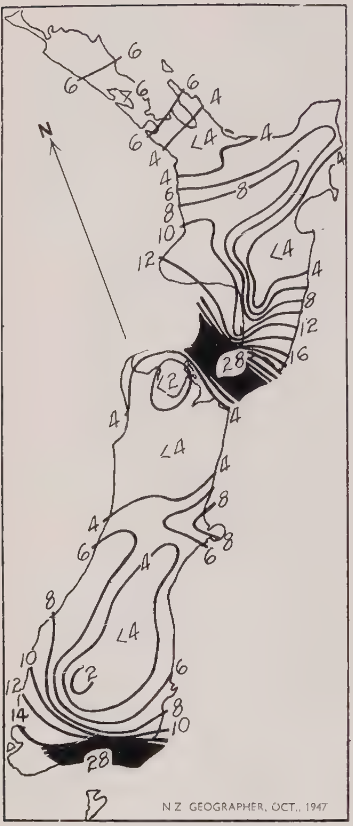


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Fig. 13. Number of gales per year.

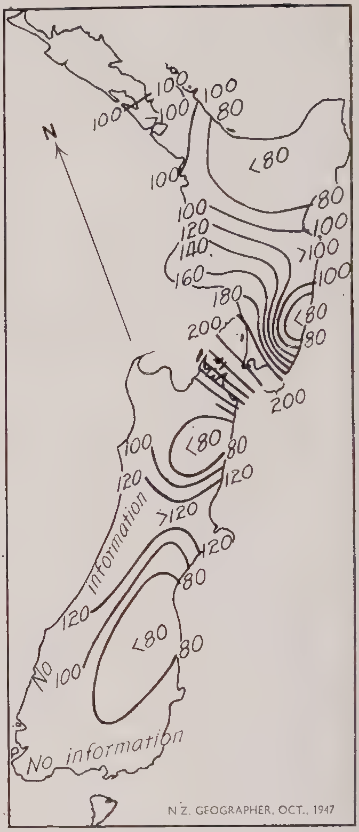

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Fig. 14. Wind miles run per day.

sheltered by the bulk of southern Hawkes Bay, but of sufficient magnitude to maintain the high totals that are annually recorded in the ranges west and northwest of Poverty Bay. (It must be remembered, of course, that the high rainfall of the Poverty Bay ranges is assisted by the passage of one or two tropical cyclones each year and by the occasional development of a wave-depression off the coast.)

Hail, Snow and Thunderstorms

The southerly or southeasterly currents also largely determine the distribution of hailstorm. Associated with air from very high latitudes, these currents have low temperatures throughout the vertical range. Therefore warming over the coast readily produces the instability, rising currents and cumulonimbus clouds which are the prerequisites of a hail storm. Highest frequencies (of twelve to fourteen occasions per year) are observed in exposed parts of Wellington and Otago, with

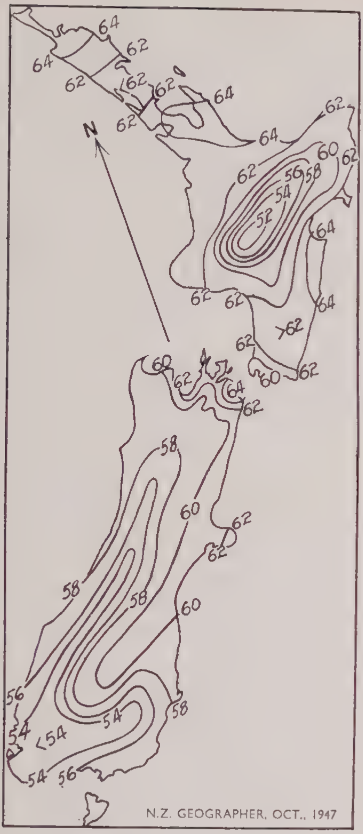

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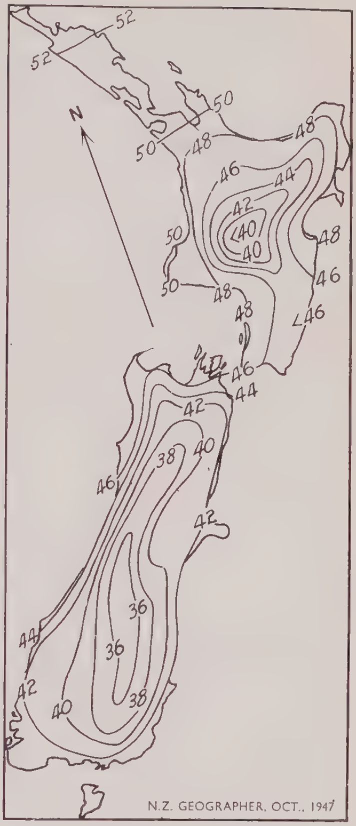
Fig. 15. Mean temperature summer.



N.Z. GEOGRAPHER, OCT., 1947

Fig. 16. Mean temperature winter.
(Deg. Fahr.)

lesser maxima to the south of Ruapehu and Banks Peninsula (*Fig.* 11). Other maxima are found where Westland is exposed to the unstable southwesterlies, and in the Auckland Province where warmer land assists in the development of instability in the southwesterlies to which Auckland is also exposed. But the hailstorm is a rarity in Marlborough and Central Otago and in Hawkes Bay and the Manawatu.

Snowfalls are also dependent on currents from a southerly quarter, but the more numerous falls of ten to seventeen occasions per annum are confined to the ranges of the South Island and the Ruapehu area. However, to the main region of high frequencies, there is a peculiar extension from Central Otago to Dunedin, where the southern stretch of the high country first presents a barrier to the cold flow.

The frequency of thunderstorms is a far more complex feature (*Fig.* 10). The lack of the necessary availability of a copious supply of moisture makes conditions practically prohibitive to thunderstorm development on the east coast, where more than two per year are seldom reported. On the west coast four distinct areas of maximum occurrence are found. First, as might be expected, there is a region of maximum frequency in the far north as a result of the high temperatures and lack of wind experienced there. Reference to Figure 14 will show that there is here in the north an area in which winds average only one hundred miles per day, and where from twelve to fourteen thunderstorms, mainly heat thunderstorms, occur annually. From here there is a gradual decrease southwards over the lowland areas where maximum temperatures are generally smaller; but frequencies are still high inland where the ranges have sufficient altitude to uplift stronger westerly currents to the cumulonimbus stage. Still further south the western slopes of the Alps present a sufficient barrier to northwesterlies, unstable westerlies and southwesterlies to develop fourteen to twenty thunderstorms per year. A great number of these however are recorded during the passage of cold fronts which, in moving north, become too weak to produce the similar phenomena when they reach more northerly districts. Figure 13 delineates other calm situations (including Poverty Bay, Bay of Plenty, Central Otago and similarly sheltered districts), and although maximum temperatures are frequently high in these areas the necessary moisture for a thunderstorm is generally lacking.

Comparison of the calm and windy areas of New Zealand amply illustrates the convergence of airflow in the central region of New Zealand. From two hundred miles run per day in Cook Strait the values decrease northward and southward, except over Central Canterbury where the ranges are narrower and may be crossed by a great number of northwesterlies. High speeds are sustained into the Manawatu, where westerlies and northwesterlies, which flow for twenty-eight to forty-two percent of the year, converge into the northwesterlies and northerlies of Cook Strait (*Fig.* 14). Later these recurve and extend over Canterbury as northeasterlies, possibly induced as the result of lowered pressure to the sheltered east of the Southern Alps.

CONCLUSION

Thus it will be seen that the surface configuration of the country and the orientation of the straits play an important part in the formation of our weather. Currents from the northwest, south or southeast are all concentrated and controlled by the shape of central New Zealand. Further south, northwesterlies, westerlies and southwesterlies are diverted by the Alps into a strong flow through Foveaux Straits, and a similar number of gales per year is general through both Cook and Foveaux Straits. Forty percent of the year under westerly control does indeed have the most outstanding influence on average conditions; but the hitherto despised twenty percent of southerly to easterly control is the determining factor of several phenomena, and it cannot be neglected in a study of regional climates. The westerlies of the 'roaring forties' are by no means homogeneous and this is adequately reflected in both the daily weather and seasonal climates of New Zealand. If this is fully appreciated, there is at hand another valuable and significant explanation of the sharply contrasted variety of the Dominion's regional climates.[4]

CLIMATOLOGY AND METEOROLOGY OF THE NEW ZEALAND AREA: A BIBLIOGRAPHY

J. C. DACRE

This summary is intended to indicate to climatologists, meteorologists, geographers, those concerned with forest conservation and management, soil conservators, and to many other persons where weather data, monthly and yearly climatological summaries and notes may be found. The various publications available are listed under the following main heads:

1. Publications of the Meteorological Office, Wellington:
    a. Those which are added to from time to time.
    b. Those issued regularly.
    c. Others.
2. Publications in the *New Zealand Journal of Science and Technology.*
3. Publications in the *Transactions of the New Zealand Institute.*
4. Publications in the *New Zealand Journal of Agriculture.*
5. Others: a. Geological Bulletins.
    b. New Zealand Official Gazettes.
    c. New Zealand Year Books.
    d. Miscellaneous publications.

1. Publications of the Meteorological Office, Wellington:
    a. Those which are added to from time to time:
        (i) *Meteorological Office Notes*:
            1. 'Diurnal Variation of Rainfall in 1928 and 1929': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 12, 1931, p. 331.)
            2. 'Hourly Sunshine at Wellington, January to June, 1929': D. C. Meldrum. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 11, 1930, p. 382.)

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[4] See B. J. Garnier: 'The Climates of New Zealand according to the Thornthwaite Classification', *Annals Assoc. Am. Geogrs.*, Vol. 36, No. 3, Sept. 1946, pp. 151–177, and also K. B. Cumberland: 'Climatic Characteristics', Appendix II to *Soil Erosion in New Zealand: A Geographic Reconnaissance*, 2nd edit., 1946, pp. 138–150.

3. 'Hourly Sunshine at Wellington, July to December, 1929': D. C. Meldrum. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 12, 1930, p. 142.)
4. 'The Occurrence of Thunderstorms in New Zealand': E. Kidson and A. Thomson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 12, 1930, p. 193.)
5. 'The Annual Variation of Rainfall in New Zealand': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 12, 1931, p. 268.)
6. 'The Annual Variation of Pressure in New Zealand': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 13, 1931, p. 39.)
7. 'Mean Temperatures in New Zealand': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 13, 1931, p. 140.)
8. 'Dry Years in New Zealand': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 13, 1931, p. 79.)
9. 'The Diurnal Variation of Temperature at Wellington': E. Kidson and A. G. C. Crust. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 13, 1932, p. 278.)
10. 'The Frequency of Frost, Snow and Hail in New Zealand': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 14, 1932, p. 42.)
11. 'Some Meteorological Data for 1930 and 1931': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 14, 1932, p. 119.)
12. 'The Canterbury "Northwester"': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 14, 1932, p. 65.)
13. 'The Wairarapa Floods of August, 1932': E. Kidson. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 14, 1933, p. 220.)
14. 'A Year's Wind Records': E. Kidson and M. E. Ewart. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 15, 1933, p. 208.)
15. 'Winds in the Upper Air at Wellington': E. Kidson.
16. 'The Summer of 1934 in New Zealand': E. Kidson.
17. 'Climatic Notes: New Zealand Districts': E. Kidson.
18. 'Some Comparisons of the Invigorating Effect of the Climate in Different Parts of New Zealand': W. A. Macky. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 19, 1937, p. 164.)
19. 'Atmospheric Pollution in Wellington': C. E. Palmer. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 19, 1937, p. 377.)
20. 'Visibility and Upper Winds': L. N. Larsen.
21. 'Climatological Observations at Eastbourne, Wellington': W. A. Macky.
22. 'The Cyclonic Storms in Northern New Zealand': M. A. F. Barnett.
23. 'Atmospheric Pressure Variations at Wellington': C. J. Seelye. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 21, 1940, p. 241B.)
24. 'Variability of Annual Rainfall in New Zealand': C. J. Seelye. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 22, 1940, p. 183.)
25. 'Exposure of Thermometers in Samoa': H. B. Sapsford. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 22, 1940, p. 136B.)
26. 'Upper Winds at Little America': C. E. Palmer. (See also *Trans. Royal Soc. N.Z.*, Vol. 71, 1943, p. 331.)

27. 'Wellington City Rainfall': C. J. Seelye. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 26, 1944, p. 36.)
28. 'Tornadoes in New Zealand': C. J. Seelye. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 27, 1945, p. 166.)
29. 'Notes on the Canterbury Floods of February, 1945': E. G. Edie, C. J. Seelye and J. D. Raeside. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 27, 1946, p. 406.)
30. 'Variations of Monthly Rainfall in New Zealand': C. J. Seelye. (See also *N.Z. Journ. Sci. & Tech.*, Vol. 27, 1946, p. 397.)

(ii) N.Z.M.O. *Professional Notes*:

1. 'Synoptic Analysis over the Southern Ocean': C. E. Palmer, 1939.
2. 'The Atmospheric Circulation of the Ross Sea Area': C. S. Ramage, 1944.

(iii) N.Z.M.O. Series A, *Miscellaneous Meteorological Notes*:

1. 'Weather Analysis in the Tropical South Pacific': J. F. Gabites.
2. 'Some Characteristics of Migratory Anticyclones in the New Zealand Area': C. Green.
3. 'Flying Conditions in the Tropical South Pacific': J. F. Gabites.
4. 'Sea Surface Temperatures between New Zealand and Samoa': M. A. F. Barnett.
5. 'Notes on Rainfall in the Pacific': C. J. Seelye.
6. 'Note on a Hurricane in the Fiji Group': E. H. Howell.
7. 'Orographical Disturbances of the Pressure Field over New Zealand': J. W. Hutchings.
8. 'Orographical Cyclogenesis over New Zealand': J. W. Hutchings.
9. Not complete.
10. 'Notes on Dew Point Temperatures in New Zealand': C. J. Seelye.

(iv) N.Z.M.O. Series C, *Climatological Notes*:

1. 'The Climate of Penrhyn Island'.
2. 'The Climate of Manikiki Island'.
3. 'The Climate of Pukapuka-Danger Islands'.
4. 'The Climate of Aitutaki'.
5. 'The Climate of Rarotonga'.
6. 'The Climate of Niue Island'.
7. 'The Climate of Pitcairn Island'.
8. 'The Climate of Tonga'.
9. 'The Climate of Raoul Island, Kermadecs'.
10. 'The Climate of Chatham Islands'.
11. 'The Climate of the Northern Line Islands'.
12. 'The Climate of the Southern Line Islands'.
13. 'The Climate of the Gilbert Islands and Ocean Island'.
14. 'The Climate of the Ellice Islands'.

15. 'The Climate of Tokelau Group'.
16. 'The Climate of Samoa'.
17. 'The Climate of Rotuma'.
18. 'The Climate of Suva, Fiji'.
19. 'The Climate of Tahiti'.

b. Those issued regularly:

1. *Daily Weather Bulletin*: cyclostyled bulletin containing selected surface synoptics, ship synoptics and upper level data for New Zealand. (Issued Monthly).
2. Meteorological Observations for the Years 1928 to 1942 inclusive. (Issued yearly).
3. Climatological Table. (Extract from *N.Z. Gazette*—monthly). See below.

c. Others:

1. 'Frontal Methods of Weather Analysis applied to the Australia-New Zealand Area' (Part 1. 'Discussion', 1935; Part 2. 'Weather Maps', 1935): E. Kidson and J. Holmboe.
2. 'Average Annual Rainfall in New Zealand (for the period 1891 to 1925)': E. Kidson, 1930.
3. 'Maps of Average Rainfall in New Zealand': C. J. Seelye, 1945.
4. 'Maps of Extreme Monthly Rainfall in New Zealand': C. J. Seelye, 1946.
5. 'Report on Extended Range Tropical Forecasting Project': Palmer, Hutchings, Byrd and Jones.

2. Publications in the *New Zealand Journal of Science and Technology*.

1. 'Phenomenal Rainfall and Floods in the North Auckland Land District': J. Wood, Vol. 1, 1918, p. 293.
2. 'Weather Forecasting in New Zealand': B. V. Pemberton, Vol. 2, 1919, pp. 87 and 165, (also published in the *New Zealand Journal of Agriculture*: see below).
3. 'Annual Rainfall Fluctuations': L. Birks and D. C. Bates, Vol. 4, 1921, p. 173.
4. 'Weather Forecasting and Upper-air Observations': B. V. Pemberton, Vol. 9, 1927, p. 99.
5. 'Sun Spot Numbers and Annual Rainfall in New Zealand': E. Kidson, Vol. 10, 1928, p. 90.
6. 'Weather and Wheat Yields at Lincoln College': E. Kidson, Vol. 11, 1929, p. 141.
7. 'Surface Wind at Waitatapia, Bulls': A. Thomson, Vol. 11, 1930, p. 411.
8. 'The Flood Rains of 11th March 1924 in Hawkes Bay': E. Kidson, Vol. 12, 1930, p. 53.

9. 'Some correlations between Vegetation and Climate in New Zealand': V. D. Zotov, Vol. 19, 1938, p. 474.
10. 'A Method of Smoothing Time Series of Data with application to Annual Rainfalls at Auckland': K. E. Bullen, Vol. 20, 1938, p. 139B.

3. Publications in the *Transactions of the New Zealand Institute.*

   1. 'On the Principle of New Zealand Weather Forecasts': R. A. Edwin, Vol. 11, 1879, p. 40.
   2. 'The Rainfall of New Zealand': J. T. Meeson, Vol. 23, 1890, p. 546.
   3. 'Australasian Weather Charts and New Zealand Storms': R. E. Schaw, Vol. 29, 1897, p. 61.
   4. 'Meteorology of New Zealand: On the Routes of High and Low Pressures and the Changes of Pressure and Wind Movement Resulting from them': R. A. Edwin, Vol. 37, 1905, p. 555.
   5. 'The Remarkable Rainfall and Meteorology of Waihi': H. B. Devereux, Vol. 42, 1910, p. 408.

   Volumes 1 to 13 (1868 to 1880) give temperature, rainfall, pressure, wind force and direction, and raindays for the chief towns of New Zealand, together with monthly notes.

   Volumes 14 to 35 (1881 to 1903) include comparative abstracts only, together with notes.

   Volume 22 (1889) provides a rainfall table for the period 1866-1889.

4. Publications in the *New Zealand Journal of Agriculture.*

   1. 'The Rainfall in 1914': D. C. Bates, Vol. 10, 1915, p. 153.
   2. 'Weather Forecasting in New Zealand': B. V. Pemberton, Vol. 18, 1919, p. 348; Vol. 19, 1919, p. 33 and p. 97.
   3. 'The Relation of Meteorology to Agriculture': R. B. Tennent, Vol. 33, 1926, p. 381.
   4. 'Climate of New Zealand': E. Kidson, Vol. 38, 1929, p. 40. (See also *N.Z. Official Year Book*, 1929.)

   Volumes 25 to 55 (September 1922 to November 1937) furnish monthly records of rainfall, raindays and averages for representative stations.

5. Others.

   a. New Zealand Geological Survey *Bulletins*:

   The following *Bulletins* contain concise meteorological data and notes mainly on monthly and yearly averages of rainfall, raindays and temperature.

   1. 'The Geology of the Hokitika Sheet, North Westland Quadrangle': J. M. Bell assisted by C. Fraser, 1906.
   3. 'The Geology of the Parapara Subdivision, Karamea, Nelson': J. M. Bell, C. J. H. Webb and E. deC. Clarke, 1907.
   4. 'The Geology of the Coromandel Subdivision, Hauraki, Auckland': C. Fraser and J. H. Adams, 1907.

6. 'The Geology of the Mikonui Subdivision, North Westland': P. G. Morgan, 1908.
7. 'The Geology of the Queenstown Subdivision, Western Otago Division': James Park, 1909.
8. 'The Geology of the Whangaroa Subdivision, Hokianga Division': J. M. Bell and E. deC. Clarke, 1910.
10. 'The Geology of the Thames Subdivision, Hauraki Division': C. Fraser, 1911.
12. 'The Geology of the Dun Mountain Subdivision, Nelson': J. M. Bell, E. deC. Clarke and P. Marshall, 1911.
13. 'The Geology of the Greymouth Subdivision, North Westland': P. G. Morgan, 1911. Cf. *Bulletins* 1 and 6.
14. 'The Geology of the New Plymouth Subdivision, Taranaki Division': E. deC. Clarke, 1912.
15. 'The Geology of the Waihi-Tairua Subdivision, Hauraki Division': J. M. Bell and C. Fraser, 1912.
16. 'The Geology of the Aroha Subdivision, Hauraki, Auckland': J. Henderson, and J. A. Bartrum, 1913. Cf. *Bulletins* 4, 12 and 15.
17. 'The Geology and Mineral Resources of the Buller-Mokihinui Subdivision, Westport Division': P. G. Morgan and J. A. Bartrum, 1915.
18. 'The Geology and Mineral Resources of the Reefton Subdivision, Westport and North Westport Division': J. Henderson, 1917. Cf. *Bulletins* 1, 6, 13 and 17.
19. 'The Geology of the Tuapeka District, Central Otago Division': P. Marshall, 1918.
21. 'The Geology of the Gisborne and Whatatutu Subdivisions, Raukumara Division': J. Henderson and M. Ongly, 1919.
24. 'The Geology of the Mokau Subdivision, with an account of adjoining areas, and of the Te Kuiti District, Pirongia and Taranaki Divisions': J. Henderson, 1923.
25. 'The Geology and Mineral Resources of the Collingwood Subdivision, Karamea Division': M. Ongly and E. O. Macpherson, 1923. Cf. *Bulletin* 3.
26. 'The Geology and Mines of the Waihi District, Hauraki Goldfield, New Zealand': P. G. Morgan, 1924. Cf. *Bulletins* 4, 10, 15 and 16.
27. 'The Geology of the Whangarei-Bay of Islands Subdivision, North Auckland': H. T. Ferrar *et al.*, 1925. Cf. *Bulletin* 8.
28. 'The Geology of the Huntly-Kawhia Subdivision, Pirongia Division': J. Henderson and L. I. Grange, 1926. Cf. *Bulletin* 24.
29. 'The Geology of the Egmont Subdivision, Taranaki Division': P. G. Morgan and W. Gibson, 1927. Cf. *Bulletins* 14 and 24.
30. 'The Geology of the Waiapu Subdivision, Raukumara Division': M. Ongly and E. O. Macpherson, 1928. Cf. *Bulletin* 21.
31. 'The Geology of the Tongaporutu-Ohura Subdivision, Taranaki Division': L. I. Grange, 1927. Cf. *Bulletins* 14, 24 and 29.

33. 'The Soils of Irrigation Areas in Otago Central': H. T. Ferrar, 1929.
34. 'The Geology of the Dargaville-Rodney Subdivision, Hokianga and Kaipara Divisions, North Auckland': H. T. Ferrar, 1934. Cf. *Bulletins* 8 and 27.
37. 'The Geology of the Rotorua-Taupo Subdivision, Rotorua and Kaimanawa Divisions': L. I. Grange, 1937.
39. 'The Geology of the Naseby Subdivision, Central Otago': J. H. Williamson, 1939. Cf. *Bulletin* 33.

b. New Zealand Official Gazettes:

Monthly rainfall totals were published in the *New Zealand Gazette* from 1889 onwards and were supplemented from 1906 by the inclusion of a climatological table (giving mean air temperature, mean maximum and minimum temperatures, rainfall and raindays at Kelburn together with rainfall and raindays only for all other stations). Notes for the month were sometimes added, these becoming more detailed from 1928 onwards. After 1940, the rainfalls etc. other than at the main climatological stations were omitted from the *New Zealand Gazette*. The table published monthly now gives in detail the air temperature, maximum and minimum temperatures, rainfall, raindays and sunshine, together with notes on the weather progression and general climate of New Zealand. The monthly gazette section on the climatology taken in conjunction with the yearly Meteorological Observations are now the two chief sources of current weather data.

c. New Zealand *Official Year Books*:

Brief notes on the climate, temperature and rainfall for the year were published from 1892 to 1897. Monthly and yearly averages of temperature, rainfall, pressure and wind at representative stations were published from 1898 to 1911. From 1912, apart from the years 1920, 1943, 1944 and 1945, there has been published a rather comprehensive account including monthly and yearly climatic notes, a climatological summary and monthly and yearly totals of rainfall, raindays, temperature, sunshine and other data of importance.

d. Miscellaneous Publications:

1. 'Climatology of New Zealand': E. Kidson, being Band IV, Teil S, of *Handbuch der Klimatologie*: W. Köppen and R. Geiger, Berlin, 1932.
2. 'Climate', E. Kidson, being Chapter VII (pp. 83-122) of *Agricultural Organisation in New Zealand*, Melbourne, 1936.
3. 'The Climate of New Zealand': E. Kidson, *Quarterly Journal of the Royal Meteorological Society*, Vol. 62, 1937, p. 83.
4. 'The Climate of the Heretaunga Plains': E. Kidson, in 'Land Utilisation of the Heretaunga Plains', *N.Z. Dept. Sci. & Industr. Res. Bull.*, No. 70, 1939, pp. 12-17.
5. 'Climatic Characteristics Affecting the Incidence and Morphology of Soil Erosion in New Zealand', being Appendix II (pp. 138-150) in

K. B. Cumberland: *Soil Erosion in New Zealand: A Geographic Reconnaissance*, Wellington, 1944 (2nd edit. 1946).

6. 'Climate': C. J. Seelye, being pp. 31-37 of *Water Put to Work*, N.Z. Public Works Department, 1945 (refers to the Canterbury Irrigation Scheme).
7. 'Weather Forecasting in New Zealand': I. E. M. Watts, *New Zealand Geographer*, Vol. 1, No. 2, Oct. 1945, p. 119-138.
8. 'The Climates of New Zealand: According to Thornthwaite's Classification': B. J. Garnier, *Annals Association of American Geographers*, Vol. 36, No. 3, Sept. 1946, pp. 151-177.
9. 'The Relations of New Zealand Weather and Climate: An Analysis of the Westerlies': I. E. M. Watts, *New Zealand Geographer*, Vol. 3, No. 2, Oct. 1947, pp. 115-129.

SOUTH ISLAND, NEW ZEALAND AND PRINCE EDWARD ISLAND, CANADA:

A STUDY OF ‘INSULARITY’

ANDREW H. CLARK

GEOGRAPHERS are as liable as any scholars to confusion and obscurity in terminology. It is true that, along with some inexcusably esoteric jargon, they have invented useful and edifying terms: ‘isotherm’, ‘conurbation’ and ‘culturally induced erosion’ are examples. Some other words which are very loosely applied, such as map ‘projections’ as a generic term, and ‘topography’ used as a synonym for relief, seem now to be acceptable to all but a few particularists. Nevertheless there are still far too many common geographic expressions which confuse rather than instruct. One need hardly refer to the semantic mire in which *Landschaft* (and its translation ‘landscape’) have landed us. ‘Cyclones’ are still referred to in text after text, although the word has surely lost any generic meaning. The list, if continued here, would be a very long one. This discussion was indeed stimulated in part by a well-documented complaint, in this journal,[1] as to the use of the word ‘steppe’.

This paper nominates for our special lexicon of geographic confusion the word ‘insularity’. Perhaps its very simplicity and apparent lack of ambiguity have been responsible for the affection in which it is held. It is certainly an important word and this is not a suggestion that it be abandoned; it is rather a plea for care, nicety and restriction in its use.

Jean Brunhes' *Géographie Humaine*,[2] one of the more important and more neglected works of latter day geography, illustrated the geographer's deep concern with the importance of insularity as a characteristic of regions. Brunhes took the concept far beyond the naively established limits of land-and-water boundaries. Whether he wrote of he isolated settlements of the Fang on the Ogawe River, of the oases of the Suf and the Mzab, of the Val d' Annivers, or of the Balearics—slands in the literal sense—he emphasised the importance of physical barriers which create cultural ‘islands’.

H. H. Allan: ‘Tussock Grassland or Steppe?’, *N.Z. Geographer*, Vol. 2, No. 1, April 1946, pp. 223-234.

ean Brunhes, *La Géographie Humaine*, Paris, 1912.

Brunhes carefully reminds us, by use of the example that no particular acuteness of intellect is required to weigh the general effect of England's insularity upon the policy and destiny of Napoleon, that one need not labour the obvious. Yet the danger in the use of the term lies less in the repetition of truisms than in the assumption that insularity implies a broad range of concomitant characteristics. Rather than attempt a scholarly exegesis of the misuse of the concept in our professional literature, this discussion will examine the application of the concept in two islands familiar to the writer: New Zealand's South and Canada's Prince Edward.[3] It is proposed to examine those physical and cultural characteristics of the islands with which the concept of insularity might be connected.

Basic Physical Characteristics

The South Island is twenty-five times as large as Prince Edward but it lies out in the Pacific, near the centre of the 'water hemisphere' of the earth, with no considerable landmass other than the North Island nearer than Australia, 1,200 miles away to the northwest. In contrast Prince Edward Island's 125-mile long crescentic outline hugs the curving southern shores of the almost enclosed Gulf of St. Lawrence. Only a narrow strait, often solidly frozen in the winter months, separates it from the mainland of New Brunswick and Nova Scotia.

Rocks in the South Island run the gamut in age from pre-Cambrian to Quaternary. Its surface forms, whether tectonically or climatically induced, are as varied as the ages of the rocks themselves. Flat alluvial plains may be bordered by rugged mountains; one of these reaches to more than 12,000 feet. This variability of surface form in an island 600 miles long and, in places, more than 150 miles wide, helps to create contrasts in climate, vegetation and soils which are truly continental in scope. The Canadian island's surface is that of a low, slightly rolling, hummocky sheet of glacial till, often very deep and of remarkable uniformity. The underlying bedrock, from which the till is almost entirely derived, is an equally uniform red sandstone, probably Permian in age. The greatest elevation barely exceeds 300 feet.

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[3] The author of the present article is engaged on a study of the transference of agricultural patterns and practices from northwestern Europe to various parts of the new worlds. There has unfortunately been a long, but unavoidable delay in the publication of conclusions that he has reached so far. Some of the results of his work in New Zealand were used for: A. H. Clark: *The South Island of New Zealand: A Geographic Study of the Introduction and Modification of British Rural Patterns and Practices Associated with the Exotic Plants and Animals of the Island*, a dissertation at the University of California at Berkeley, available only in the library of that institution. The whole study has now been prepared for publication in book form and will appear late in 1947 or early in 1948.—Editor's note.

Erosion and subsequent submergence have given to Prince Edward Island a severely irregular, indented shoreline; in two places the head-waters of completely tidal streams are so close as to nearly divide the island into three distinct parts. No place on the island is more than twelve miles from tidewater. While the South Island's heavily settled areas are, it is true, closely peripheral, access to the sea is generally much more difficult. Good harbours are rare on the generally straight coastline except in uninhabited Fiordland and in the Queen Charlotte Sound area of the extreme northeast; where they occur, terrain difficulties prevent

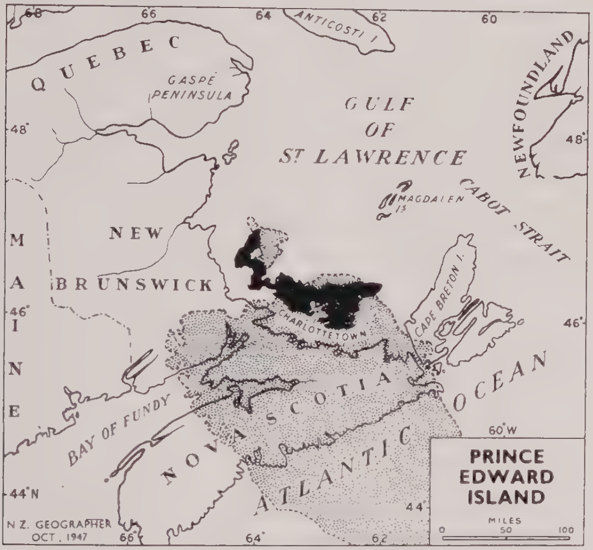

Fig. 1. Map of Prince Edward Island and adjacent parts of Canada and New England, with that portion of the South Island of New Zealand that lies in similar latitudes superimposed on the same scale.

asy access to their settled hinterlands. Thus each island has different ttributes which might be called 'insular'; where one is in an isolated ot in the open sea the other nestles in a deep bay on a continental elf—yet the people of the latter are in much more intimate contact ith the sea than those of the former. Which, then, is the more truly nsular'?

The climatic contrasts between the two islands centre chiefly around cal variability in the larger island compared with almost complete niformity in the smaller, but there are others of importance. The outh Island's climate is not unlike that of the British Isles. In a some-hat lower latitude than the United Kingdom it is not as clearly affected the neighbouring oceanic circulation. The climate of Prince Edward

Island, in latitude approximating to the southern tip of the South Island, is rather to be compared with that of *New* England. One might easily suppose that, in climate, the South Island would show distinctly more insular characteristics. The two principal features by which maritime and continental climates are contrasted, latitude for latitude, are found in the annual regimes of air temperature. The more maritime climates ordinarily have reduced temperature ranges and a relative delay of the seasons. The South Island does, indeed, have much warmer winters and slightly warmer summers. The highest mean monthly temperatures (in January) are from 3°F to 10°F lower than those of Prince Edward Island in July (65°F), whereas the temperatures of the extreme winter month (usually July in South Island stations) average well above 40°F and are at least 15°F above those of the coldest month (February) in Charlottetown.[4] The lag of maximum and minimum temperatures behind the solstitial extremes of insolation are, however, greater in the Canadian island and the general seasonal lag is even more marked. Most South Island stations have seasons corresponding well in occurrence and length with those of the continental United States. In Prince Edward Island, however, the spring is cold and backward, the autumn warm and lingering. Not only is February colder than January and August almost as warm as July, but September is warmer than June, October is as warm as May, November warmer than April and December little colder than March.

It is even more difficult to contrast the insularity of stations in terms of climatic factors other than air temperature. Reliability and uniformity of regime throughout the area may perhaps be thought more insular than continental; if so, however, the South Island would be classed as the much more continental of the two. On the windward side of the Southern Alps stations have recorded well over 300 inches of precipitation; immediately to the leeward, in Central Otago, are stations with mean annual totals of less than fifteen inches. It is doubtful if any part of Prince Edward Island varies, on the average, as much as two or three inches from Charlottetown's total of nearly forty inches a year. While reliability studies in either island are rather sketchy as yet, they suggest that the Canadian island may have the less variable record. Not only does one thus speak of more 'insular' climates with trepidation in comparing these two islands, but one develops extreme caution in speaking of 'insularity of climate' anywhere as an absolute concept.

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[4] These somewhat generalised means are based on *Monthly Record of Meteorological Observations*, Dominion Meteorological Service, Toronto (summarised to 1930 in C. Koeppe, *The Canadian Climate*, Bloomington, 1931) and on ten-year averages of annual means from data in the annual issues of New Zealand *Meteorological Observations*.

A little more substance for the concept of relative insularity may be drawn from a comparative study of the pre-European vegetation. Prince Edward Island was clothed in 1534 (when the first European visitor, Cartier, landed there) with a dense and uniform forest of mixed deciduous hardwoods (maple, oak, ash, birch and poplar) and northern conifers (spruce, fir, larch and pine). The South Island's flora was chiefly of two major ecological classes: 'rainforest' generally to the wetter west and tussock grassland to the drier east. Prince Edward Island's forest was an unbroken extension of the flora of the neighbouring continent; the South Island showed a high degree of individuality both in the general character of the association and in the many unique genera and species. This is undoubtedly a reflection of long isolation; but one must be careful to note that the isolation implied relative location more than insularity itself.

Pre-European Populations

Culturally, as ecologically and climatically, Prince Edward Island was simply a fringe of the North American continent in the 16th Century. The Micmacs, a tribe of Algonquin Indians who lived by hunting and fishing, roamed over not only the island but large areas of the adjacent mainland. There was little to distinguish them from a great many other tribes that ranged from the Great Lakes - St.Lawrence basin to the Arctic Ocean. If our southern hemisphere example had been Tasmania, what a striking example of 'insularity' in culture we would have had in contrast! Unfortunately for the simplicity of the argument, New Zealand had been settled, at the time of Cook's arrival in 1769, for only a few hundred years by a group of Polynesians who showed close cultural affinities to the rest of that remarkably uniform mid-Pacific ethnic unit. In the move to New Zealand the Maori failed to bring in, or at least to maintain, pigs and fowl, two very important elements of mid-Pacific economy. Few of the tropical plants survived as important elements in the cooler climate, and really only the sweet potato (*kumara*) was a significant agricultural staple in the new land. In the South Island of New Zealand a small, peripheral Maori population was dependent on its cultivation only to a very minor degree.[5] This change from

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Despite the relative unimportance of this activity, it reached at least as far south as 44° (Temuka, South Canterbury), the highest latitude at which agriculture has been reported in the southern hemisphere in pre-Columbian times.

reliance on a narrow but satisfactory range of domesticated plants and animals to dependence on fishing and the hunting of birds represents a distinct variant of Polynesian economy. In the case of failure to establish pigs and fowl, which by later evidence would have thriven magnificently, we are certainly dealing with the problem of cultural diffusion over a broad ocean barrier and the effect of relative isolation. In the case of the plant base, however, the difficulties were largely climatic, and the effect of 'insularity' has to be assessed with great care.

The Polynesians were undoubtedly skilful seamen by virtue of necessity; the Micmacs were highly skilled canoemen, but rarely ventured far from land in their bark canoes. Yet if we compare the Maori alone with the Micmac we find that the former, in fact, ventured little more to sea than the latter; after the fourteenth century the vaunted Polynesian navigational ability was little employed from the New Zealand islands. A temptation to contrast the more insular Maori with the more continental Micmac in terms of use of boats must be strongly resisted.

European Immigration

The long, and in each case rather involved, stories of the peopling of the two islands by Europeans have been combed for evidences of some clear effect of insularity. Many tentative inferences have suggested themselves but most, in the end, seemed to boil down to a general matter of relative location with which insularity was only very incidentally concerned.[6] We may thresh and winnow the thin gleanings rather quickly.

Each island was ultimately settled, to a very large degree, by folk from the British Isles. This in turn is attributable principally to a common British sovereignty, the establishment of which was the easier for a nation which controlled the seas in the eighteenth and nineteenth centuries. There may indeed have been other forces in which the factor of insularity played a part. Prince Edward Islanders feel that the relatively small number of New Englanders (variously known as 'Loyalists' and 'Tories') who settled in the area after the Revolutionary Wars might have been greatly augmented but for the isolation inherent in that insularity. Probably a much more important hindrance to a large immigration from this source, however, was a disinclination of the southern colonists to accept tenancy under an archaic system of absentee landlordism fastened on the island by the home government when Britain acquired Ile St. Jean[7] from the French by conquest in 1758. A more certain effect of insularity was the ease of execution of Jeff Amherst's order by which several thousand Acadian French on the island were rounded up and deported in order to remove a threat of disaffection. Only some 30 families escaped the purge, yet these are almost the sole ancestors of a good fifteen percent of the island's present population. It is reasonable to suppose that, failing this eighteenth century example of what has become a distressingly common practice of 'relocation', Canada would now have two predominantly French-speaking provinces. The struggling little settlement of French at Akaroa on Banks Peninsula in the South Island hardly constituted a parallel case, but its failure again may be partly attributed to Britain's superior equipment for defending and controlling islands.

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[6] The factor of relative location in the historical geography of New Zealand has been discussed separately. See A. H. Clark: 'Historical Explanation of Land Use in New Zealand', *Journal of Economic History*, Vol. 5, No. 2, November 1945, pp. 215-230. (See also 'In Our Contemporaries' pp. 206-208).

Political and Social Institutions

The work of students of political and social history in the two islands does not suggest that insularity played a distinctive role in the development of present institutions and attitudes. Perhaps the probability of open rebellion when governors became too autocratic was less, but in neither case did lack of military potential reduce the vociferousness or frequency of complaints to London when these were indicated, and representative and responsible government advanced with a speed comparable with that in most other British colonies where the population was derived largely from the home islands.

The South Island of New Zealand is a part (the larger in area and smaller in population) of a country with one of the most completely centralised governments in the world. There is a remarkably high degree of unanimity among its people as to methods and objectives of government, a concensus which must be ranked as both a cause and effect of centralisation. Uniformity of government—and hence of education, taxes, and to a large degree of economic opportunity—did nothing to hinder the rather high degree of mobility which has been evident in the population; this mobility in turn has helped to maintain uniformity and to reduce the development of cultural regionalism. The voice of federalism has not been effectively raised in New Zealand since the original provincial governments were abolished in 1876. That over half of the population is urban, and that the urban groups supply the principal support for the socialist (Labour Party) government which has been in power since 1935 does not effectively change this thesis. The country is basically dependent on its agricultural and pastoral production and, though the majority of the farmers combine with the rural communities to support the conservative (National Party) opposition, the socialist government has had to keep the interests of farm production always in the forefront of its programmes.

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[7] This French name, translated to St. John('s), was used by the British until 1799. The celebrated Baptist had been rather too popular in northeastern North America, however, and confusion of mail, especially with St. Johns, Newfoundland, and St. John, New Brunswick, led to the change. The Prince Edward so honoured, was to be Queen Victoria's father.

Webster defines 'insular', in the figurative sense, as 'narrow, circumscribed, illiberal'. New Zealanders of both nominal political persuasions have combined to give the country a record as the leader of the western world in the demonstration of practical democratic process and in social and political experimentation and reform. In effect both parties subscribe to a doctrine of state socialism; a careful study of the election campaign of 1946, in which the nominally socialist party barely held its majority, suggested that the nominal conservatives were simply arguing that they could run state socialism better than their opponents. One cannot escape the feeling that even pronounced American 'New Dealers' would consider the programme to which New Zealand's conservatives subscribe as definitely on the radical side. Certainly both parties are in solid agreement as to the most complete operation of democratic process. Nowhere in the world does the individual voter have more voice in government, and nowhere is he so certain that he will maintain democratic control.

The two parties have a similar international outlook; there have been no important cleavages on essential questions of international viewpoint for years. Much of New Zealand's internationalism has, it is true, been part of a feeling of identity with a world-wide empire, but it indicates no trace of a narrow provincial nationalism. In twelve years the socialist government has done nothing to ratify that so-called 'Magna Carta of Dominion independence', the Statute of Westminster. Moreover, of late, New Zealand has been opening more and more independent legations abroad, and has taken an enthusiastic, and highly vocal part in the organisation of the United Nations. In brief, there are few *less* apt adjectives to use in describing New Zealand's socialistic, intensely democratic, internationally oriented, restlessly experimenting political and social character than the synonyms which Webster suggests for 'insular'.

Prince Edward Island is very much the least of Canada's nine provinces, with less than one percent of that Dominion's population, and an even smaller fraction of its area. The island sends but four members among the many hundreds who assemble in the House of Commons in Ottawa. It conducts one of the simplest and most frugal provincial governments in Canada and handles provincial affairs (roads, schools, etc.) in a thoroughly conventional and conservative manner. Its lack of influence in the federal government is matched by a lack of real interest among most of its people. Social and political attitudes in general show a high degree of conservatism; there is a resistance to the 'new-fangled' which is in marked contrast to the popular spirit of New Zealand. Antagonism to experiment is matched by a notable degree of isolationism. One has the inescapable feeling that a loyalty to Crown and Empire which certainly matches that of New Zealand, and has led to very great contributions in two world wars, is based on a deep love of tradition rather than on any essentially cosmopolitan world viewpoint. Prince Edward Island failed to join the confederation of colonies into the Dominion of Canada for six years after that union was established. The older folk still talk of going 'up to Canada' on a trip to Montreal. Cars from beyond the maritime provinces which venture on the island's roads are, universally, 'foreign' cars. These are only a few of many symptoms of cultural introversion. Even within the island, despite the uniformity of habitat, there are distinct cultural 'islets' of French, highland Scottish, lowland Scottish, Irish or English origin. To the confusion of the environmentalists we must rate Prince Edward Island as culturally and politically much more 'insular' than South Island.

General Economy

The two islands have similar economies in the sense that they are both heavily dependent on primary production from the land and that they depend on roughly the same range of products. There are, however, important differences which may, in part, be related to comparative insularity. Prince Edward Island is very closely settled over its whole area, with a crude density of population, and a ratio of 'rural' population per square mile of 'occupied' land, both approximating forty. Such densities in the South Island, are found only in selected parts of the coastal plains, and large parts of the island are virtually uninhabited. The South Island's more than half million people are very unevenly grouped and over half of them live in large towns or cities. Charlottetown, capital and metropolis for Prince Edward Island's 90,000 people, is about the size of Nelson, and the island's second town has less than 4,000 people. By any classification its population would be considered to be well over 80 percent rural.

To allow for some perspective, representative data[8] for the late twenties and early thirties are used to compare the economies. In New Zealand agricultural and pastoral production, before processing, accounted for about sixty percent of the total value of production, manufacturing for 25-35 percent, mining for something over three percent and forestry for something less. Prince Edward Island in the same period showed proportions for agricultural and pastoral production of eighty percent, for manufacturing of ten percent, fisheries 7½ percent and forestry 2½ percent. The figures for the South Island alone are not available but, if anything, the proportion assigned to manufacturing would diminish, whereas those of agricultural and pastoral production and mining would increase. Greater isolation has undoubtedly contributed to a greater degree of manufacturing in New Zealand, but the industries of the South Island (railway workshops, meat freezing establishments, butter factories, machine repair, etc.) represented, in general, either processing of primary raw materials (largely for export) or necessary services for the primary producers. Prince Edward Island's manufacturing activity is still more clearly servicing and processing. The island has not even the coal or water-power of the South Island to assist any potential industrialisation.

LAND USE

Both islands are primarily concerned with direct use of the land, chiefly for agricultural and pastoral production. Both have a mixed, rotational, cropland-pastureland economy in which animals figure prominently; both show marked derivations from the land-use economy of the British Isles. Figures illustrate the comparison.

In 1930 South Island counted roughly 14 million sheep, 650,000 cattle, 125,000 horses and 100,000 pigs. Prince Edward Island, with a much smaller area and less than one-fifth the population had 80,000 sheep, 100,000 cattle, 30,000 horses and 40,000 swine.

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[8] The somewhat rounded and generalised figures used in the following pages were obtained or calculated from various publications of the Dominion Bureau of Statistics (Canada) and the New Zealand Department of Census and Statistics. These included: the 'Census of Agriculture [for Prince Edward Island]', of the Canadian *Seventh Census* (1931) and *Eighth Census* (1941); *The Maritime Provinces in their relation to the National Economy of Canada*, Ottawa, 1934; and the annual *Official Year Book* and *Statistical Report on the Agricultural and Pastoral Production of New Zealand*, both originating in Wellington.

TABLE I

Percentage Proportion of 'Livestock Units'

	Sheep	Cattle	Horses	Swine
Per head of population				
South Island (1930)	26.7	1.2	0.2	0.2
Prince Edward Island (1931) ..	0.9	1.1	3.3	0.5
Per 100 acres of 'occupied' land				
South Island (1930)	60	2.7	0.6	0.4
Prince Edward Island (1931) ..	6.6	8.5	2.6	3.5
Per 100 acres of 'improved' land				
South Island (1930)	230	11	2.5	1.7
Prince Edward Island (1931) ..	10.3	13.2	4.0	5.4

TABLE II

Land Uses as Percentage of Total Area

	Occupied	Improved	In Field Crops, Including Hay
South Island (1940–41) ..	64	17	3.1 (approx. 1,200,000 acres)
Prince Edward Island (1931) ..	85	51	33.0 (approx. 500,000 acres)

TABLE III

Crops as Percentage Proportion of Total Cropland

	South Island (1940–1)	South Island (1929–30)	Prince Edward Island (1931)
Oats	21.1	21.2	30.1
Wheat	17.5	18.9	4.0
Barley	2.7	1.4	0.8
Other cereals and flax	3.0	1.4	4.6
Hay and grass seed	18.7	11.9	47.5
Potatoes	0.9	1.5	10.8
Field roots (turnips, mangolds, etc.)	23.3	30.2	1.7
Forage crops	12.8	13.5	0.4
	100.0	100.0	100.0

The distinction of chief importance is the fact that the South Island is today so largely 'sheep country', as it has been since a decade after the beginning of formal settlement. The degree of utilisation of other animals in the two islands is not strikingly different, but the South Island's dependence on sheep is balanced by Prince Edward Island's dependence on cash crops.

Whereas in New Zealand as a whole unprocessed agricultural and pastoral production provided some £65 millions of a total production of £114.2 millions in 1935-6, only £9.2 millions came from cash crops. The rest was contributed by animal products (butterfat, meat, wool, etc.). The South Island's proportionate value of agricultural, as distinct from pastoral, production was undoubtedly greater, but it could hardly have yielded as much as one-quarter of the total value of production at best. In Prince Edward Island agricultural and pastoral production accounted for eighty-five percent of a total value of production amounting to $23.5 million in 1929, and for seventy-three percent of the total in 1931. In the latter year field crops supplied more than half the total value of production, and more than two-thirds of the total for all contributions from the farm.

The two islands have climates and soils corresponding in general to those of the 'hay and dairying belts' of North America and Europe. Both islands have permanent pastures and temporary leys which are rotated with the field crops. While hay is important in both islands, the more severe winter in Canada and the consequent necessity for housing stock in that season, makes this crop much more important there. In the South Island a much larger area devoted to field root and green forage crops (chiefly *Brassicas*) serves the same general purpose for outdoor winter feeding. Potatoes are much the most valuable crop per acre on Prince Edward Island, and vie with hay as the leading crop in value, ordinarily constituting between a quarter and a third of the value of all field crops. This crop is proportionately more valuable to the economy of the northern island than the South Island's two most valuable crops sold off the farm (wheat and grass seed) are to its economy. The soil and climate of Prince Edward Island are exceptionally favourable to the growth of the best seed potatoes, and the island shares with New Brunswick and Maine the great market for seed potatoes in the American east coast trucking strip which extends from Long Island to Florida.

We thus find, in the two islands, standard variants of a grass-grain-roots-animals type of mixed rotational farming so common in north-western Europe and which has been carried thence, chiefly from the British Isles, to many parts of North America, Australia, New Zealand, South Africa and cooler parts of South America. The South Island lays its principal emphasis on pastoral production, and within this class, on sheep. Prince Edward Island emphasises cash crops sold off the farm, particularly potatoes; but one is impressed almost equally in both islands by the large areas in pasture grasses each year. Because grass is so important to both, and because the cooler summers which encourage good grass growth are in considerable degree due to insular, or better, maritime location, we must give some credit to insularity for the similarities. There seems to be no clear inference as to the manner in which relative insularity may have contributed to the differences seen. *Location* has undoubtedly aided the development of Prince Edward Island's potato industry, but the fact of insularity as such has probably hindered it. The South Island's emphasis on sheep seems to be connected with the fact of insularity only incidentally through the influence of climate (where the factor of insularity is, in turn, rather hard to assess) and the facts of relative location.[9] In both islands the exigencies of trade and transportation have, however, played some significant role in shaping land use, and insularity has some obvious incidence on transportation costs and facilities.

TRADE AND TRANSPORTATION

Although the South Island's farm lands do not compare with those of Prince Edward Island in maximum distance from tidewater (a dozen miles), they are all rather close to the sea; and short, relatively inexpensive railway hauls bring products to several major, well-equipped harbours. The relative cheapness of ocean transport places the markets of northwestern Europe, or indeed any seaboard markets in the world, within much easier reach of the producers of the South Island than of farmers in, say, Manitoba, Illinois, or the Transvaal. Granted the superb climatic conditions for the production of lamb, wool and butterfat, the South Island—and of course all of New Zealand—has been able to compete successfully in the world market partly because of this transportation factor. Particular emphasis has been on sales to Britain, a focus encouraged by dependence on imports from the United Kingdom. The fact that this trade is between islands, with very little land transportation at either end and thus chiefly by ocean freighter, has certainly done nothing to discourage it. The demands of the British market in turn have had a significant influence on patterns and practices of land use in New Zealand.[10]

Prince Edward Island's transportation problems have affected its whole economy rather unfavourably; particularly has this been true during the railway era of the past century. The island has one excellent deepwater port, Charlottetown, and two others have been improved to provide facilities for the larger ocean freighters; there are also many smaller ports with minimum depths of 10 feet or more. In the days of small ships, sail or steam, the island was on an equal footing with other parts of northeastern North America so far as transportation was concerned. With the coming of the railway, and with the increasing importance of rapid transit, Prince Edward Island's competitive position became steadily poorer. Even after the expense and delay of transhipping from the local railway trucks (the first part of the island's railway was completed in 1875) to ships to cross the strait to mainland railway trucks was reduced by the introduction of a rail ferry, it was by no means eliminated. Large ships occasionally take a cargo of potatoes or turnips from island ports to various destinations on the Atlantic coast from Newfoundland to Cuba, but there is relatively little import by ship, and this reduces the attractiveness of the local ports as places of call for the coastal vessels. Both local production and the local market are too restricted to invite satisfactory shipping services. Difficulties of transportation have in turn prevented the development of many kinds of truck farming (notably smallfruits) and animal industries for which the island is well suited. There is no question of the importance of the regional insularity in its effects on land use and farm economy from this point of view.

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[9] Clark, 'Historical Explanation . . .', *op. cit.*, 1945.
[10] *Ibid.*

Conclusion

This has been a far from exhaustive treatment, but sufficient has been said perhaps, in discussion of two particular islands, to serve as a warning to users of the expression 'insularity'. Generalisations which are not almost self-evident truths would seem to be highly speculative. To a large extent the 'insularity' which might be stressed is rather to be read as 'maritime location' or 'relative location'. The use of the word 'insular' in cultural connotations has well-established precedents, but the connection with insularity in the physical sense is, at best, an obscure and complicated one. Each region must be carefully studied to assess the incidence of the factor of insularity on each element of its regional character. Otherwise we must accept the charge that we fail to inform or instruct as we tolerate continued confusion of meaning in a popular geographic term.

THE NEW ZEALAND GEOGRAPHICAL SOCIETY: ITS PROGRESS AND PURPOSE[1]

B. J. GARNIER

IT IS NOW nearly three years since the New Zealand Geographical Society was formally constituted as a dominion-wide, incorporate body. Although the society as we now know it dates officially from the inaugural meeting held in Wellington in August 1944, the real beginning was made in Christchurch some years earlier when, in 1939, a small group of enthusiasts banded together as an overseas branch of the (English) Geographical Association. This branch as such did not last long. The spirit of independence stirred within it, and before two years had elapsed it had severed its connections with the association in England and adopted the title 'The New Zealand Geographical Society'. Christchurch, therefore, is the birthplace of our society and it is more than appropriate that this address, which is the first occasion on which the progress and purpose of our organisation has been reviewed in public, should be delivered here.

EARLY HISTORY AND EXPANSION

Modest enough were the society's beginnings. Its members consisted mainly of interested persons among the council, staff and students of Canterbury University College, together with a small number of school teachers concerned with geography or allied subjects. But the group was full of energy. Apart from meetings and discussion groups, it undertook the preparation of a syllabus in geography to co-ordinate the work in the primary school and the postprimary school. This syllabus was never printed, but it has been more influential than is realised. It has been my privilege to be associated with the recent revisions of geography prescriptions for both postprimary and primary schools, and those of us that dealt with these two matters studied, and were influenced by, the Christchurch report.

In October 1943, Dr. K. B. Cumberland paid a visit to Wellington and there suggested that an attempt should be made to form a Wellington Branch of the New Zealand Geographical Society. In the face of objections that such a project could not be successfully achieved during wartime, he pointed to the success of the organisation in Christchurch, and so great was his enthusiasm that a number of us in Wellington were inspired to make the attempt. Preliminary publicity was undertaken, a hall booked, and Dr. G. Jobberns kindly consented to come at his own expense to give the address. The response of the public exceeded all expectations. The estimate of one newspaper reporter who came to report the meeting but failed to get in was that well over a hundred persons were turned away. Such enthusiasm encouraged the decision to associate the sections in Christchurch and Wellington as branches of one incorporated society, to establish branches in Auckland and Otago, and to launch the publication of a journal without which it would be impossible to secure members outside the main centres.

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[1] An address delivered at the third annual meeting of the society held in Christchurch on June 11, 1947.

Incorporation and Activities

Through the willing co-operation of many people these objectives were achieved by the end of April 1945. The incorporation of the society took place in August 1944; the Auckland Branch was formed in February 1945; the Otago Branch the next month, and volume one, number one of the *New Zealand Geographer* appeared in April of the same year. It is quite impossible to pay adequate tribute to all those who helped in this work. All manner of publicity was undertaken and busy people gave freely of their time. I must, however, make special mention of the generosity and confidence in the society of the Hon. Minister of Internal Affairs. But for the financial assistance which he gave us, and continues to give us, it is doubtful whether the *New Zealand Geographer* would have appeared as soon as it did, and it is certain that the quality of its paper and printing would have been lower.

The society now has a membership of 1514. Fifty-two of these are overseas members and the remainder reside in New Zealand. The majority of overseas members are in either England or Australia, but we can count among our members individuals in places as diverse as Hongkong, Baghdad and Baltimore.

Our membership, taken at its face value and in conjunction with the youthfulness of the society, may be regarded as satisfactory. Yet it gives no cause for complacency. It is not uncommon in New Zealand that a society such as ours meets with enthusiasm to begin with and then declines to such an extent that its existence is imperilled. Whether this happens in this instance depends upon the energy with which we tackle the situation. The possibility of decline is to be seen in that every branch, other than Auckland, records a smaller membership this year than last year. It is by no means an alarming drop being but twenty-two members or 1.4 per cent of last year's total; but it must not be allowed to continue. I suggest three things that may help to prevent it.

The first is to note that about half the members of each branch lives in the main centre which forms the branch headquarters. We shall maintain and increase membership in these localities largely through the attractiveness of the programmes we offer. A varied series of lectures, supported on as many occasions as possible by films, seems to be a good general plan upon which to work. There are many possible programmes and it is quite unnecessary for me to do other than draw attention to their need for attractiveness. I would like to stress, however, the value of a monthly meeting notice which is more than a formal notification of meeting. A letter which says something about the speaker and his subject, invites members to bring along their friends, and generally impresses members with the attractiveness and importance of the night's meeting will, I am sure, go a long way towards adding to the society's membership.

COUNTRY MEMBERS

Secondly, the case of members living outside the main centres should be considered. Membership will be maintained and increased principally through the provision of reading material. Herein lies the value of the *Record*, with its summaries of branch affairs. Nevertheless the *Record* has been designed to unite all members, both within and without the main centres, under the one organisation. The chief ways in which branches may keep the interest of those members who are unable to attend meetings is through an attractive monthly newsletter and by arranging an occasional lecture in some centre within their branch district. It is not, I think, asking too much that every branch should arrange at least one lecture a year outside their city headquarters. It is essential, however, that there be some suitable follow-up to the lecture. This might be accompanied by a drive for new members or the formation of a sub-group which would then arrange its own annual programme—one planned to meet the needs of the district which t serves.

Thirdly, I would like to suggest that now is the time for publicity drives by all branches. When each branch was established membership was recruited largely on the basis of good intentions. Prospective members were promised meetings and a journal, but the nature of these things—especially of the journal—could not be clearly stated. We are now in a position to state very definitely what a member of the society will obtain for his subscription. This should, I think, form the basis of any new publicity drive, particularly in places outside Auckland, Wellington, Christchurch and Dunedin where there may be persons who, realising their inability to attend meetings, were reluctant to join in the past, but who may now be willing to become members in view of the privileges now available to them.

PUBLICATIONS

But the New Zealand Geographical Society is more than a collection of individuals partaking in branch activities. It is also a publishing organisation. Its publishing activities are of supreme importance not only to the success of the society within New Zealand but also to the dissemination abroad of geographical information about this country.

There are now 316 libraries and institutions on our list of subscribers to the *New Zealand Geographer*. In addition, thirty-three copies of the journal are distributed free or in exchange for other journals. The exchange arrangement is extremely valuable. It is not only a means by which the *New Zealand Geographer* becomes known, particularly abroad, but it also brings into the society's growing library a number of journals from abroad not usually obtainable here. Of the 349 addresses on our free, exchange and library list, 123 are overseas addresses, particularly in the British Isles, the United States and Australia. Other countries which figure in our overseas list are Sweden, France, the U.S.S.R., Austria and Brazil. Approaches are at the moment being made to institutions in Italy, Germany and China, and it is hoped that exchanges or subscriptions will result.

When the first number of the *New Zealand Geographer* appeared in April 1945, it altered a situation in which New Zealand was the only British Dominion without a journal specifically devoted to geography. In his foreword to this number the editor wrote:

> 'The *New Zealand Geographer* aims . . . to interpret the Dominion to its people and to provide for overseas readers a body of geographic knowledge about this

country. It aspires to stimulate within New Zealand the study of geography in schools, colleges, and university. It hopes to be of assistance in the affairs of the Dominion, in the solution of its problems—internal and external—and in the further development and conservation of its resources—natural and cultural. It has a further objective in the expansion of the membership of the New Zealand Geographical Society, and the promotion of the society's general aims and objects . . . . . We hope finally that it may have a circulation as wide as that of its counterparts and that it may ultimately rank with them in the magnitude of the service it performs.'

The time is not yet ripe to pronounce final judgment as to whether or not these objectives have been or will be achieved. The journal has certainly been a means of increasing our membership. It has also served to create overseas an interest in the geography of New Zealand. Reviews of the *New Zealand Geographer* have been more than favourable. Some indication of the service it performs can be seen in the fact that over forty copies are subscribed to by the Department of External Affairs for distribution to its overseas offices. Moreover, it was gratifying to receive quite recently an airmail letter from a university in the United States requesting a full set of back numbers and submitting a future subscription because our journal was 'urgently required for special research work'.

These are matters on which the society can congratulate itself. Nevertheless, the *New Zealand Geographer* is far from having 'a circulation as wide as that of its [major] counterparts'; nor can we claim that it is widely recognised as a medium for discussion, in their geographic aspects, of the Dominion's internal and external problems. These objectives can best be achieved by perseverance and the steady support and encouragement of an expanding society membership.

AIMS AND PURPOSES

The society's rules state simply that it was founded 'to promote and stimulate the study of geography'. This somewhat general statement may be suitably amplified by developing three ideas. In the first place the society was founded to provide an organisation to which people interested in geography may belong. It is the only geographical society in this Dominion, and prior to its foundation New Zealand was the only Dominion without a geographical society. Corporate activities, in the form of meetings, excursions and so on, are necessarily largely run by branches. This is right and proper, and the more decentralised the society is, the better. It seems desirable, however, that there should be at least once a year a large scale meeting under the auspices of the society as such. The annual general meeting is suitable for this purpose. Up to now the annual general meeting has not been made the occasion of a major public address or function. Instead it has been regarded apparently as a necessary evil which must be tolerated because of the requirements of incorporation and which could best be disposed of in the form of a short meeting prior to a monthly branch meeting. Tonight's meeting alters this situation somewhat and heralds what will, I hope, become a permanent feature of the society; namely that the annual general meeting will take the form of a major function and public address, and that it will receive notice in the press, and wide publicity.

A further means of bringing society members together is the decision of the council in May last to institute a summer school in geography in the second half of January 1948. The intention is that it should last about ten days and take place at Massey College, Palmerston North. A programme of excursions and lectures is being arranged, with the general object of studying Palmerston North and district and its place in New Zealand as a whole. It is hoped that this summer school will provide a useful social function in which society members from all parts of the country will be able to come together and together take part in lectures and field work in geography.

The second major purpose of the society lies in its publishing activities. Indeed, this is the main reason for the existence of a central body. I have already spoken of the value of the *New Zealand Geographer* and other publications in the maintenance of membership and interest in the society. But there is more to it than that.

The greater part of the existing geographic literature about New Zealand contributes mainly to systematic geography and was principally the work of those interested in the natural sciences, especially geology, meteorology and botany. This was due mainly to the lack, until quite recently, of university studies in geography. But it was also the outcome of the fact that there was little opportunity of publishing here the results of work in regional and human geography. Existing journals tended to concentrate on certain specialised lines, and none of them catered for the needs of geography.

The *New Zealand Geographer* aims specifically to fill this gap. It offers a medium for publication of material in any branch of geography. One particularly neglected aspect is regional geography and, as recent numbers of the *New Zealand Geographer* show, this gap is being filled chiefly by the publication of some of the high class thesis material prepared by honours students. It is hoped, however, that we shall not always have to rely solely on this source of supply for regional studies, but that in due course postgraduate students will also be encouraged to advance our regional knowledge of New Zealand.

The *New Zealand Geographer*, then, helps to further the society's objects in many ways. It is, in some respects, the society's core, and the standard of article and printing must be maintained at all costs. However we must not be content to limit our publications to writings of article length only. If the full purposes of the society are to be achieved we ought to expand our policy to include the publication of the results of major research projects. A book such as Dr. K. B. Cumberland's *Soil Erosion in New Zealand* might well have been a publication of the New Zealand Geographical Society had we been in a position to undertake it at the time of its completion.

Major projects of this kind are well worth encouragement and the council has now decided that we are in a position to institute a series of special publications by the society. The general plan is to undertake the publication of essays which are too long for inclusion in the *New Zealand Geographer*. Each submission will be considered on its merits and every care will be taken to ensure a high standard of special publication.

A decision of this nature has not been taken without considerable thought. Some attention was given to the possibility of increasing the number of appearances of the journal each year. Apart from the technical difficulties of securing regular publication three or four times a year, it was felt that the institution of a series of special publications would better serve the purposes of the society. A society such as ours should do what it can to encourage major research projects. In our present financial situation the greatest encouragement which we are able to offer is the publication of suitable full length material.

Publicising Geography

The third reason for the society's existence is the publicising of geography. In order to explain what is meant by that I would like to refer briefly to the history of geography in New Zealand. During the period prior to the establishment of advanced courses in geography at Canterbury University College, the subject was mainly in the hands of geologists. It is of interest to note that the only full length book, bearing the definitive title *The Geography of New Zealand* was written by a geologist, Dr. Patrick Marshall. All the public examining, too, was conducted by persons similarly trained. It is not surprising, therefore, that geography in New Zealand has been traditionally associated with studies in the physical aspects of the earth, and that such aspects of human geography as were treated were covered usually in the descriptive, factual, and statistical pattern set by Marshall's book. Moreover, it came to be supposed that training in some allied subject, such as geology or economics, was adequate qualification for the teaching of geography. The position is analogous to regarding a training in French as adequate for the teacher of English or in chemistry for the teacher of botany. It also came to be thought that geography was capable of no contribution to learning which could not be achieved just as well by some specialist in another branch of learning—a view which can only be proved false through the patient development and publication of research in geography.

Geography in University and School

The herald of change came when Dr. G. Jobberns undertook the development of the Department of Geography at Canterbury University College. Under his enthusiastic guidance the department has grown, has had on its staff a number of scholarly geographers and has produced a number of able students. The department has persevered on an uphill course. One of the chief difficulties it had to face was that it was compelled to teach to a syllabus, not of its own choosing, but subject to the approval of persons in other university colleges, some of whom were inclined to require the inclusion of material which was so voluminous in terms of factual information that it militated against the teaching of geographic method and philosophy.

The position now, of course, is vastly different. Independent departments of geography were established in February 1946, at both Auckland University College and in the University of Otago. The lectureship in geography at Victoria University College is nominally under the professor of geology, but owing to the scholarly broadmindedness of Dr. C. A. Cotton the lecturer is virtually in independent charge. The result is that the status of geography in the university is now similar to that of other subjects and is faced only with those difficulties of organisation, syllabus and so on which are inherent in our federal university system.

Parallel with this development in the university is the development of the subject in schools. It is true that it is to some extent mixed up with social studies, yet it is a subject of examination in its own right in both School Certificate and University Entrance. Moreover, the number of candidates in geography in these examinations is very considerable—in 1946 over 4000 sat School Certificate Geography—and it is a fact that geography occupies, for the time being at any rate, a prominent place in the school curriculum.

I do not know to what extent the society can claim to have assisted in the events of the last two or three years. Certain it is that a few months after one of its branches had passed, and distributed to various educational authorities, a resolution urging the establishment of advanced courses in geography in the three university colleges not providing these facilities, the new university teaching posts were advertised. But whether or not we did, in fact, influence these decisions, I am convinced that this society can play an important part in furthering the cause of the subject still further.

Although geography can be said to have 'arrived', as it were, as a university and school subject, it is still widely regarded as suitable only in that sphere. There is a popular supposition, which must be overcome if possible, that it is largely a descriptive study, useful in schools in providing knowledge of the world, and useful in the university in providing prospective school teachers with a good teaching subject. That it is a good teaching subject, I do not for a minute disclaim. I assert, however, that geography should be recognised as more than a subject for teachers and schoolchildren. It should be recognised as a necessary subject of study for many of the recruits to the Department of Scientific and Industrial Research, the Meteorological Office, and a variety of other government and public offices too numerous to list here. That geographers have a considerable contribution to make in these spheres may be seen from the success of geography graduates from Canterbury University College who have secured employment in various positions in the public service and other organisations.

New Zealand is a country which is fraught with problems the full significance of which can often best be revealed through the methods of geographic analysis. There are many lines of possible development: climate in its regional aspects, for instance, or the whole field of the geography of population and settlement, or the regional geography of virtually the whole country. Whether the value of our contribution is recognised, however, depends upon the quality of the work achieved. It also depends to some extent on the amount of publicity given to geographic work. In this members of this society can help considerably by drawing attention, when they reasonably can, to the work of geographers here and overseas, and the contribution of this to the solution of national and international problems. If members do this it may well be that the society will be instrumental in widening the field of employment for geographers in New Zealand. This achieved, we shall have played a not unworthy part in promoting and stimulating the study of geography.

This survey of the progress and purpose of the New Zealand Geographical Society indicates that a considerable amount has been achieved in the last three years. From small beginnings the society has grown into a nation-wide organisation and into a publishing body whose journal is read in many lands. This is undoubtedly a matter for self-congratulation. Past success, however, should inspire a bold and forward-looking policy. This implies the support and enthusiasm of all members so as to ensure the stability of the society and the full achievement of the purposes for which it was founded.

FEILDING: A RURAL TOWNSHIP AND ITS REGION

L. L. POWNALL

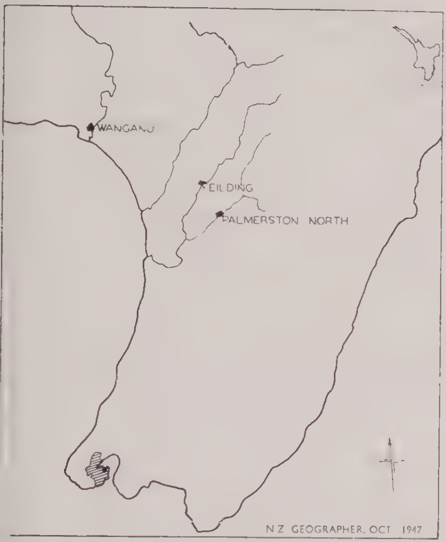

Fig. 1. The southern portion of the North Island of New Zealand, showing the position of Feilding.

BASICALLY New Zealand's economy is dependent on the land—on the pastures, the nature of the climate, and the skill and industry of the farmers. An important cog in the complicated machinery of agricultural production and distribution is the market town. Few New Zealand towns, however, are purely market centres. Nevertheless many of the smaller urban centres in New Zealand depend largely on their immediate local region for their commercial existence. Representative of such centres is the market town of Feilding.

With its five thousand inhabitants, Feilding is the second largest urban settlement in the Manawatu region of the North Island. The own benefits from its situation on the North Island Main Trunk Railway, ninety-nine miles from the metropolitan centre of Wellington. Some residents suggest that Feilding is handicapped by the roximity of its city neighbour, Palmerston North, twelve miles to ne south. Twelve miles to the southeast is the narrow Manawatu Gorge, which provides the only low altitude east-west route in the outhern portion of the island. Thus Feilding has that important eographic factor of central location, particularly with reference to ne southern half of the North Island (*Fig.* 1).

Its situation at the junction of the Oroua Valley and the Manawatu lain is of special significance to the town. The small Oroua River orms the eastern boundary of the borough and is of industrial importnce. Except for a small residential area on the hillside, Feilding occupies the level floor of the Oroua Valley. The greater part of the town lies within a square approximately formed by North, South, East and West Streets, and bisected by the main street as a diagonal from southwest to northeast. Rectangular street blocks are formed by parallels or intersections of this diagonal, Kimbolton Road. The plan was conceived in England and then fitted to the site, an attempt being made to copy the English city of Manchester. Thus historic rather than geographic factors govern the form of the town.

EARLY SETTLEMENT

The 'Emigrants and Colonists Aid Corporation', a private company under the chairmanship of the Duke of Manchester, landed '23½ statute emigrants' at Foxton in 1874. These first settlers found the site of Feilding a natural swamp clearing at the junction of the Oroua River and the Kiwitea and Makino Streams. Here the township was already being surveyed. As the clearing of the surrounding forest proceeded, and with the arrival of more immigrants, the diagonals of Kimbolton Road and Manchester Street were planned as the chief thoroughfares, and at their intersection the first business premises were constructed. So successful was the work of development of the town and its tributary region that by 1881 Feilding was declared a borough.[1]

CONTEMPORARY FUNCTIONAL CHARACTER

Contemporary Feilding performs six functions: commercial, industrial, administrative, social, transport, and residential. One of the most important of these is the commercial function (*Fig.* 2).

In the stock farming circles of the North Island, Feilding occupies a unique position. Because of its situation the weekly Feilding stock sale prices are the ruling prices for the fat stock markets of the North Island. In size of yards and number of animals sold, some 8,000–9,000 each week, Feilding is recognised as one of the largest fat stock markets in New Zealand. The importance of a sale which attracts to the town every Friday from 300 to 400 buyers and spectators, their wives, and often their families, is well recognised. Attendance at the sale is frequently a weekly event for the farmer of the Feilding district. When he is there his role is generally that of a spectator. The farmer seeks to discover from such visits the type of animal for which there is a demand, and the trend of such demands; and at the same time he likes to indulge n that very necessary adjunct to successful farming—frequent discussion vith his fellow agriculturalists. On such occasions, for example, the nformal contracts are entered into for the transfer of stock from the igher land to the plains for fattening and breeding.

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[1] T. A. Gibson: *The Purchase and Settlement of the Manchester Block.*

The importance of this aspect of the commercial function of eilding must be stressed. The town comes to life on a Friday; the ommercial and tertiary services are taxed by the influx of the farming ommunity and the local residents who show a decided preference for onducting their business on the same day. At such times Palmerston orth, with its large drapery and retail stores, is viewed by some eilding retailers with alarm. Before the recent war it was often ustomary for the farmer to transact his business in Feilding while his amily proceeded to Palmerston North by car or bus. However, artime petrol restrictions gave a temporary advantage to the retailers f Feilding.

It is estimated that twenty percent of the total population of Feilding directly dependent upon the commerce of the town for their living. his total is distributed among marketing, banking, retailing and rofessional business services. An interesting feature of the business ructure of Feilding is the large number of commercial firms, other han retailers, for a town of this size—four banks, five law firms, four ccountancy and secretarial offices, and three real estate agencies. This an indication of the fact that where the farmer markets, there he has is banker, accountant, lawyer, dentist, stock and station agent, and ften his retailer. Without the weekly stock sale much of the present ommerce of Feilding would be lost to the town.

SECONDARY INDUSTRIES

Industry supports over fifty percent of the population of Feilding. nlike the compact commercial area, the largest industries are peri-heral (*Fig*. 3). Two aspects of industry are important to Feilding. hese are processing and conditioning, and manufacturing. In pro-essing, the freezing works provide employment for 250 workers hroughout the year, and seasonal work from December to April or ossibly July for 500 men. Of this number four-fifths are resident in eilding; the others travel from Palmerston North or live on small rms in the district. Most of these Feilding seasonal workers are ermanent or semi-permanent residents who are employed in their ff season' on neighbouring farms. Their seasonal insecurity is evidently

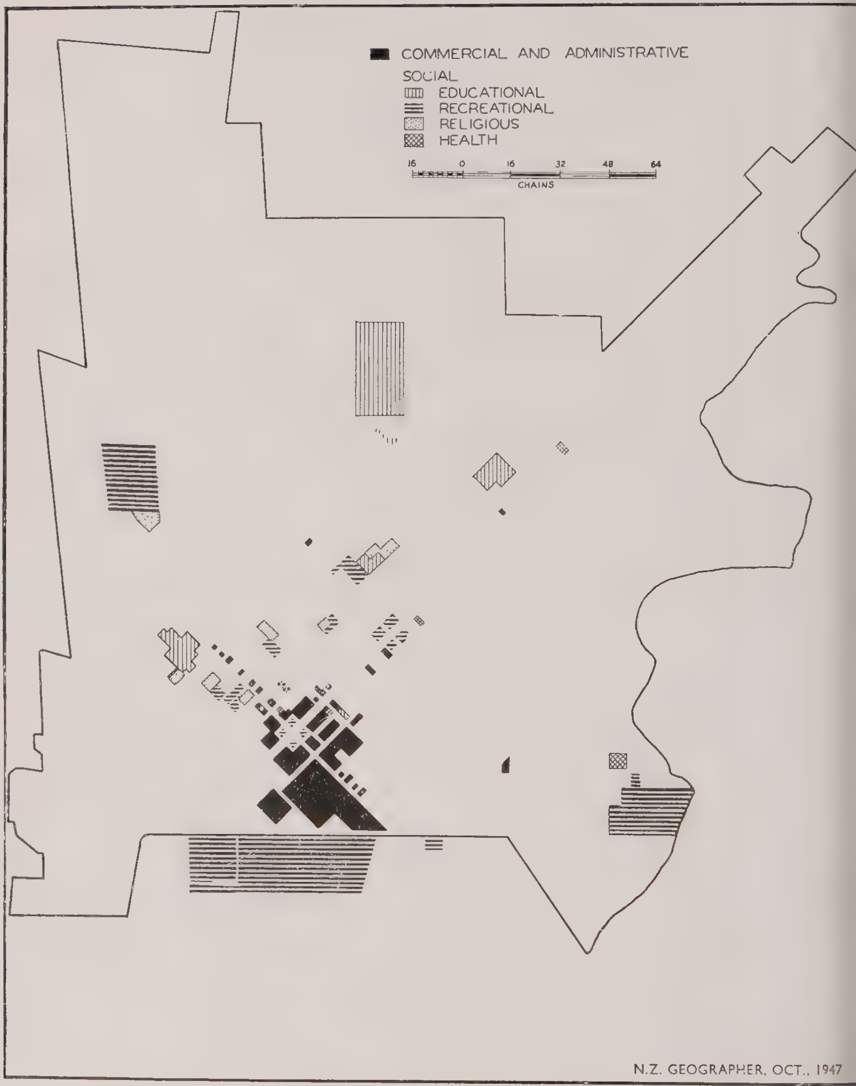


Fig. 2. Commercial, Administrative, and Social Buildings and Related Areas.

compensated sufficiently by the high wages paid in the meat freezing industry. The works lie on the eastern bank of the Oroua River, the river providing the large volume of water used in the industry. Some 500,000 carcasses are handled each season by this freezing works, in competition with the factories at Wellington, Wanganui, Palmerston North, Petone and Patea.

A quarter of a mile down the river from the freezing works is the Feilding wool scour. Like its larger neighbour on the opposite bank,

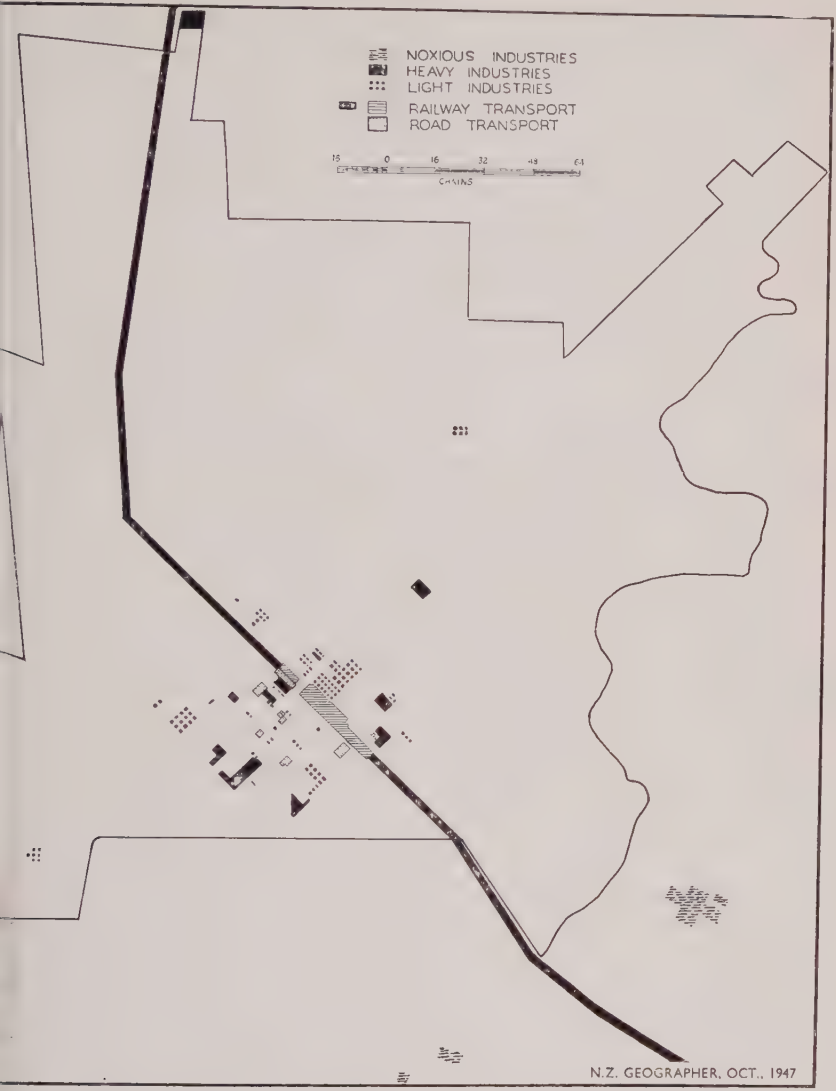


Fig. 3. Feilding: Industrial and Transport Buildings and Related Areas.

scour requires a large volume of water for the processing of wool. e soft water of the Oroua River is a factor in the present location of s industry. Basically, however, Feilding is not a good location. Wool scouring, under existing wartime restrictions, is received from the praisal centres of Wanganui and Wellington. After scouring, the duct has to be railed again to the ports for export, and thus the ustry has the expense of double freight charges on a bulky product. ite closer to Wellington might result in a saving of transport costs;

moreover the local supply of wool is not important to the industry. The total wool supplied by the Feilding district would only be sufficient to keep the factory in operation for three weeks of the year. With its annual output of 15,000-20,000 bales of wool, this scour is the largest in New Zealand.

In contrast to the peripheral location of the other processing industries, the Feilding bacon factory is located in the business core of the town. The present location of the factory is apparently due to geographic inertia. Like the wool scour, this industry depends upon a supply area and market more extensive than that of the immediate Feilding district.

The processing industry is further represented by the local seed works and flour mill. The former is concerned with the treatment of grass seed and grain. Feilding is the centre of an extensive grain-seed area which, before government certification was adopted, produced the well known Sandon ryegrass. Practically the whole of the grass seed of the Manawatu goes to the Feilding works for dressing and distribution. A considerable quantity is exported to Australia, England and the United States.

The extension of the Feilding Borough to include the Cheltenham Dairy Company's site at Makino has produced the northern prolongation of the borough from the simple form already described. This was done in order to connect the factory with the local drainage and sewerage system. From Makino the company collects farm-separated cream daily from 750 suppliers over a large area. It is an indication of the farm economy of the area that of these 750 suppliers only 300 are solely fulltime dairy farmers and that they are, by New Zealand standards, only small dairy farmers. The annual output of the Cheltenham factory of 2,000 tons of butter places this creamery amongst the largest in New Zealand.

The establishment of a small clothing factory at Feilding in 1944 is an example of the type of industry which can profitably make use of the existing labour supply and industrial facilities of towns such as Feilding. In this direction Feilding should develop, especially when Palmerston North reaches its optimum size as an industrial centre.

ADMINISTRATIVE FUNCTIONS

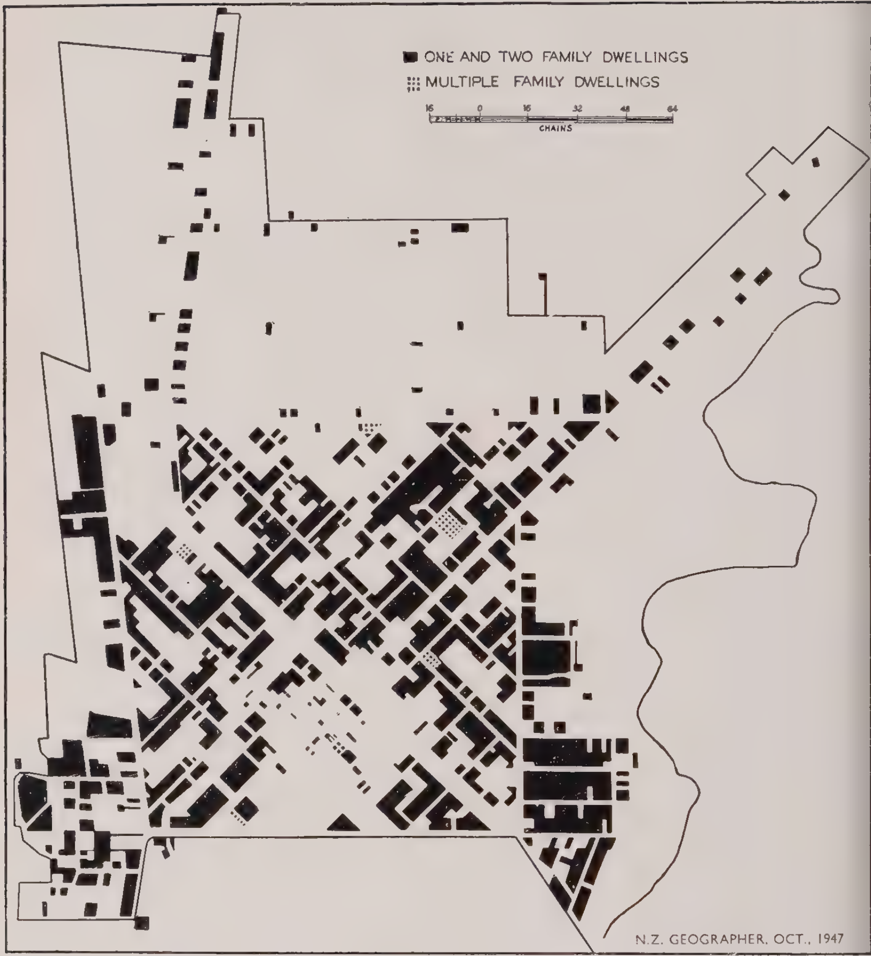
Today government administration from Feilding as a centre has almost ceased. When Palmerston North can conduct the requisite ervices, government offices have been transferred from the smaller entres and consolidated in a central regional office. Only essential ocal government services remain in Feilding. However, the adminis-ration of some local bodies from Feilding will continue. This is ccounted for primarily by the location of Feilding at the mouth of the Oroua Valley. The main road to the 'back country' follows the course f the river and affords the easiest means of access for the settlers and the esidents of the smaller townships.

Feilding provides educational, entertainment, recreational, health nd religious services. The Feilding Agricultural High School has stablished a reputation as an agricultural secondary school. Educa-onally, too, Feilding is noted for its Community Centre, a pioneer in hat field of education. The other social functions, though no less nportant than the educational, dominate only the immediate vicinity f the town or the lower reaches of the valley.

For a time it appeared that Feilding might become the junction of e North Island Main Trunk Railway and the Wanganui-Taranaki ranch Line, a position ultimately filled by Marton to the northwest. owever, the prospect left its mark on the morphology of the town ith the construction of the extra-wide Kimbolton Road. Although eilding failed to become a junction, the railway was constructed rough the town, and consequently all traffic along the main road is day interrupted whenever a railway track is being used.

After the construction of the railway, the importance of Feilding creased. This was partly due to the fact that the north-south trend of e larger valleys of the North Manawatu has made it easier to follow e valleys rather than to cross the divides. Thus relief explains the ttern of communications, and the situation of Feilding accounts for e importance of the town as a transport centre.

The transport function of Feilding is based on the rail and road vices. Today these are largely co-ordinated; the road services operate om the railheads in a 'feeder' capacity. Feilding is one of the largest tward railway fat stock stations in New Zealand. Much of this ffic is carried in special Sunday trains which arrive at the freezing orks in Wellington, Wanganui and Petone, in time for the Monday lling'. Between December and January an average of four trains of s type is despatched each Sunday from Feilding. The collecting of stock is almost wholly done by motor lorries, for although the ck firms still employ some drovers this trade has almost ceased


■ ONE AND TWO FAMILY DWELLINGS
⁙ MULTIPLE FAMILY DWELLINGS
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N.Z. GEOGRAPHER, OCT., 1947

Fig. 4. Feilding: Residential Buildings and Related Areas.

because of the competition of modern transport. Inward rail traffic includes stock for the weekly sale, for the freezing works, bacon factory, and February ram and ewe fairs. The latter are closely associated with the stud stock farm economy of the Feilding region. But in general terms Feilding is today a local distributing centre for goods, and a railway collecting point for fat stock.

An important transport feature is the daily movement of large numbers of passengers from Feilding to Palmerston North. By calculating the average number of passengers carried on all transport services for a representative month during the period of the petrol restrictions it was possible to obtain some idea of the volume of

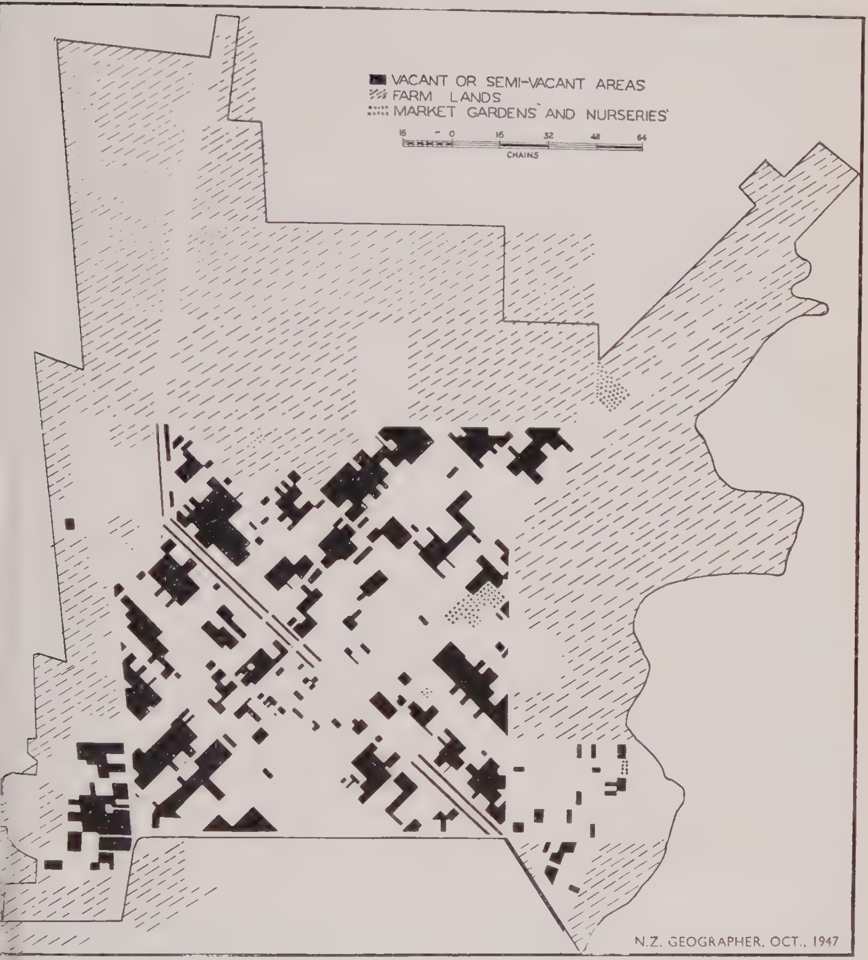
■ VACANT OR SEMI-VACANT AREAS
▨ FARM LANDS
⁘ MARKET GARDENS AND NURSERIES
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Fig. 5. Feilding: Land not used for building purposes.

passengers. On this basis it was estimated that over 5,000 Feilding residents journey to Palmerston North each month. Out of this total 4,000 of them do so to shop or to attend the theatres. This large and persistent volume of passenger traffic from Feilding to Palmerston North is a feature of the smaller town. Its effect on the retail and commercial expansion of Feilding is extremely important. For most of the residents a weekly or fortnightly visit to Palmerston North has become a habit.

Three aspects of the function of Feilding as a residential centre are readily apparent. First, the town provides for the workers of the town itself; secondly, it is a dormitory centre for Palmerston North and the small neighbouring townships; and thirdly, the town is a residential centre for a comparatively large number of retired people. Few large houses of modern construction are to be found in Feilding. The oldest-settled residential areas are close to the business core and can easily be recognised, while large areas of land for housing still exist (*Figs.* 4 and 5).

Feilding serves as a dormitory centre for many people employed in Palmerston North. It is difficult to estimate accurately the number, but probably some 50-60 travel to the city each day. A few residents work in the smaller local towns such as Kimbolton, Sanson, and Bunnythorpe. The primary residential function of Feilding, however, is as a centre for its own local workers.

The Tributary Region

Feilding exists because it performs these various functions. In performing them the town depends upon certain areas, the extent of which varies from business to business. There is, however, an area truly tributary to Feilding. As an individual region this area has that unifying characteristic of dependence upon Feilding. Its boundaries are limited by the transport pattern, and this in turn is limited by the character of the land surface. A full appreciation of the geography of the town requires a brief study of the composition of this region tributary to Feilding. The boundaries are economic, although as such they are often coincident with natural boundaries (*Fig.* 6).

In order to appreciate fully the present character of this region it is necessary to have some knowledge of its physical traits, for these have conditioned the whole pattern of the land use and settlement evolved by man in putting the resources of the habitat to his use.

The surface configuration of the region has developed out of an old level area which extended far out from the foot of the Ruahine Ranges. The upper surface itself is probably a feature produced by a former cycle of planation. For some reason or other, probably regional elevation of the land, the river system has dissected this old level surface forming a pattern of valleys which in their general arrangement might be compared to the outstretched fingers of the hand laid upon the map. This newer cycle of planation is responsible for the present Manawatu plain (of which the Oroua plain is merely a part). From this Manawatu Valley plain and Oroua Valley plain, the valleys of the river system decrease rapidly in width, so that at their heads the valley walls become precipitous. The divides between them, however, are even-crested plateau remnants and low dome-shaped hills of considerable summit area. It is the precipitous character of the walls of the upper valleys which makes communication between them difficult. Their depth is only moderate, but their steep-sided character is a great handicap to movement from one valley to another. These features of the surface are reflected in the distribution of soil and natural vegetation types, and in the striking climatic variations found within the region.

THE NATURAL LANDSCAPE

The climate is conditioned by the situation of the region to the west of a mountain divide in a westerly wind belt. The region experiences cool, frequent and often strong winds on most days of the year, and rain on one day in every two with a winter maximum. It has a high insolation record, slight variation in monthly temperatures, but frequent frosts and often winter snow on the higher country. It is a region with a bracing climate—ample rainfall, sunshine, a temperate summer and winter, and an abundance of windy days. The latter factor accounts for the high number of sunshine hours in spite of the even distribution of precipitation.

European settlement has little changed the nature and distribution of the pre-1874 soils. The natural soils were predominantly yellow brown loams and yellow grey loams. Small areas of recent soils formed from alluvium flank the lower reaches of the rivers. On the steep slopes of the dissected upland are skeletal soils formed under the natural bush cover and the heavy rainfall of those areas. Removal of this forest has resulted in the loss of the fertile topsoil in many cases. Much of this material has been deposited on the present flood plains of the rivers and streams, frequently to become breeding ground for weeds which spread on to the better land.

On the lower river flats and swampy areas the indigenous plant association was kahikitea semi-swamp forest with an admixture of other podocarps and shrubs. On the ridges and in less moist habitats generally the association shifts to tawa and the forest may be termed a tawa community. On the areas of higher relief above Waituna and Kimbolton, tawa and mixed podocarps are characteristic, dominant types being matai, rimu, and totara. Around Apiti the kamahi appears and increases in abundance with increasing altitude. The red beech (birch) is common around Apiti and Rangiwahia where the association becomes a typical beech forest. On even higher areas is subalpine scrub followed by

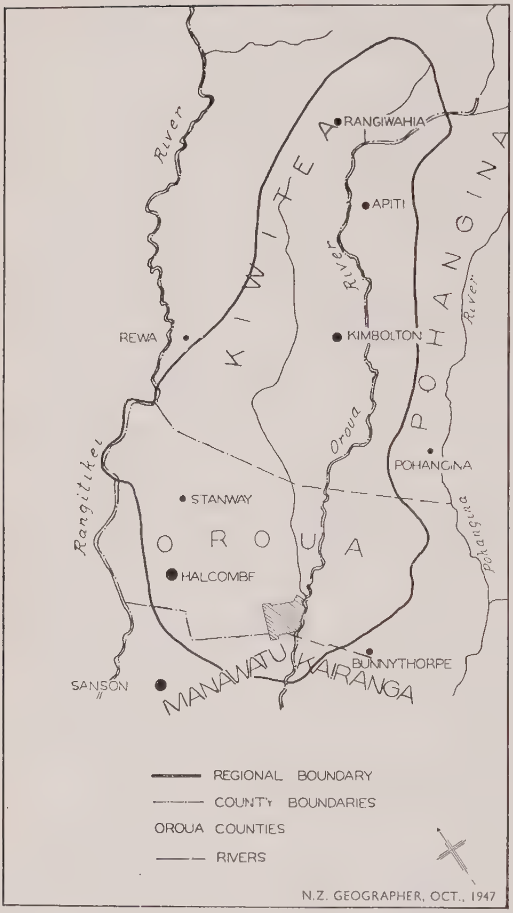

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Fig. 6. Feilding: Tributary Region.

tussock grassland and herbfield. The latter areas, however, are scattered, small in extent, and relatively unimporant in the Feilding region.

The present population distribution of the Feilding region reflects surface configuration in so far as population tends to concentrate on the lower areas where the better soils are found. Here agriculture can be more intensive, and here also are most of the routes within the region. In general the pattern of population distribution is related closely to methods of land use as they vary from place to place: it is also dependent upon proximity or otherwise to urban centres. Apart from the Rangiwahia and Apiti Valleys, where the particularly high density of rural population can be attributed to the fine quality of the land, the regional distribution of population can be explained, in order of importance, in terms of relief, position relative to the plains, and land use. The population-communications-surface form relationship is particularly noticeable in the region. Five small townships of 100-200 inhabitants serve as local centres for the more densely settled areas, Rangiwahia, Apiti, Kimbolton, Halcombe and Sanson. They generally comprise a hotel, hall, post office, school, one or two stores, and a similar number of churches.

Feilding failed to become a railway junction and today the Main Trunk Railway skirts the southern and western boundaries of the region, which has therefore to depend upon the road system rather than the railway for its transport services. The road system is dominated by the surface configuration: in this respect it is like the population pattern to which it is necessarily related. The main roads follow the northeast-southwest valleys, and are paralleled by electricity and post and telegraph lines. It is only in the most remote areas that electricity is not at present supplied. Each township has a manually operated telephone exchange with its 'party lines' and limited hours of service each day. Thus, to the residents of this region the daily mail car, the telephone and the electricity lines provide transport, power and communication facilities which follow routes largely dictated by surface configuration.

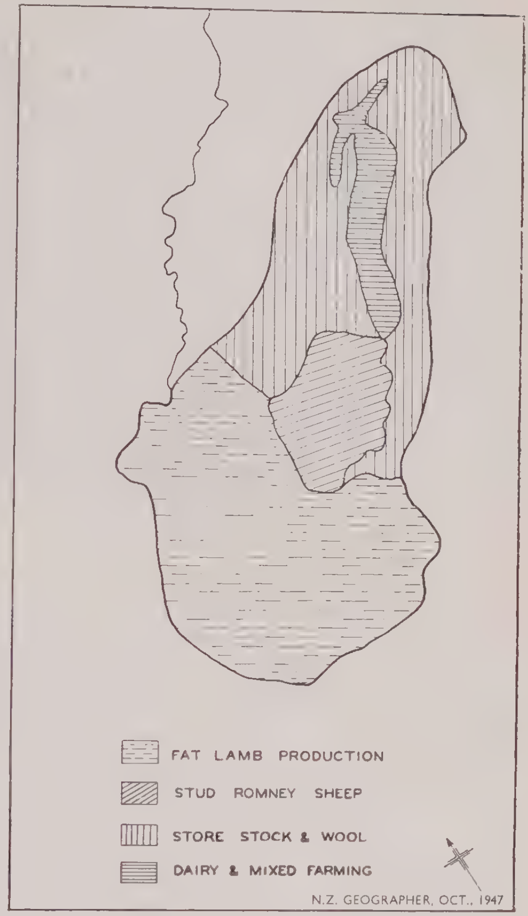

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Fig. 7. Feilding: Land Use Regions.

Cultural Vegetation

In 70 years man has almost completely modified the natural vegetation cover of the Feilding region. He has accomplished this by milling the more accessible timber, burning the forest of the steeper areas, and sowing the land down in grasses. On the more nearly level areas of the region mixed high-production pastures predominate, with ryegrass, white clover, Yorkshire fog and cocksfoot as the main grasses. Improved sheep pastures form a semicircular band around the high production pastures and merge into the rough, hill country grazings

Fig. 8. In the last twenty-five years the commercial core of Feilding has shown little morphological change. This photograph was taken in the early 1920's.

Photo: Hobday Studio.

on the areas of moderately steep relief. The attempt to establish pasture on such land has not been completely successful and bracken fern, weeds and secondary growth are found throughout the area, and on the steepest and most inaccessible faces standing bush still remains. The upper valleys of the region, centred on Apiti and Rangiwahia, are areas of improved pastures of cocksfoot, ryegrass, Yorkshire fog, browntop and white clover. On this flat, ploughable land, however, the high altitude and winter cold militates against such good pasture growth as is found in the areas of mixed, high production pastures in the south. However, the present vegetation cover as a whole, and its distribution, are closely related to the land use.

Land Use Regions

The Feilding region is dependent upon agriculture. Milling of timber on a large scale has ceased; the extensive search for oil by American engineers of the Superior Oil Company has given no promise of mineral resources; and the people of the region continue to look directly and indirectly to farming for their livelihood.

Land use in the Feilding region may be roughly said to consist of four main types. The basis of classification, however, is almost entirely one of emphasis on some particular aspect of farm production. The northern half of the region is devoted to fat and store lamb production, and is a part of a much larger land use region. This is rough, hill country with patches of standing bush and much secondary growth, particularly

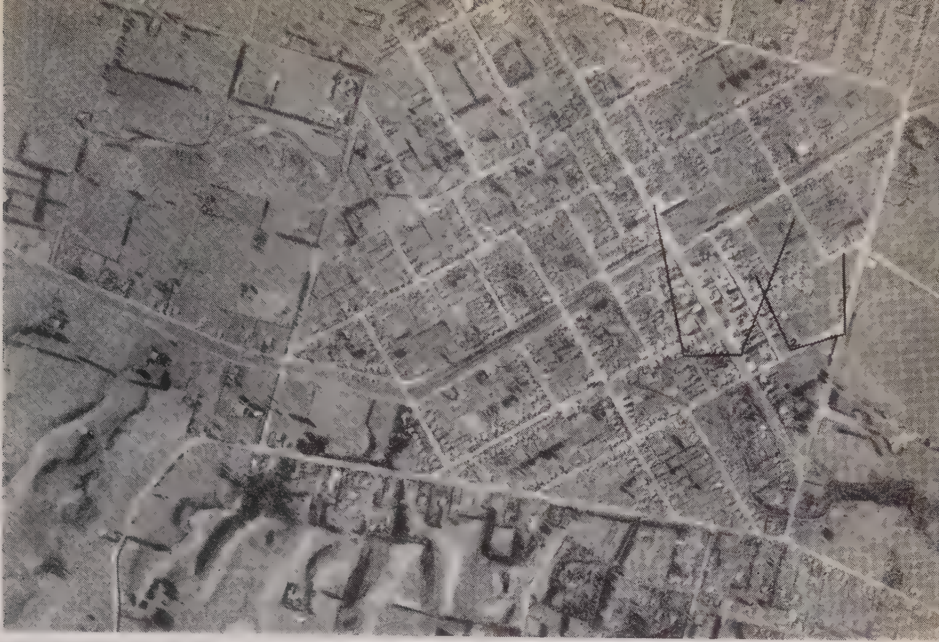

Fig. 9. The regular layout and grid pattern of Feilding are typical of many New Zealand towns. The black frames indicate the position of portions of the town represented in other photographs: 1, commercial area (*Fig.* 8); 2, saleyards (*Fig.* 10).

Photo: *N.Z. Aerial Mapping Ltd.* and *N.Z. Dept. of Lands and Survey.*

on the steeper areas. Farms average 300–640 acres, and the chief sources of income are fat and store lambs and wool. Cattle are carried mainly as agents of pasture and fern control, but at the same time they provide a secondary source of income as store stock.

On the small, abandoned flood plains of the upper river valleys mixed farming is practised, chiefly dairying and supplementary cropping for the surrounding region. On the small farms, which average 200 acres, income is in the main derived from butterfat and from the sale of pigs. The Rangiwahia Dairy Company, for example, produces a particularly high grade of creamery butter. The major reason for this is the small supply area of the company. Contributory factors are the dominance of cocksfoot pasture, the rarity of tuberculin diseases because of the elevation, and the fresh water of the mountain streams which is used in the butter making. In contrast with the previous area, practically all the timber has been removed from the valley floors.

Between Kimbolton and Cheltenham is a compact area which is recognised as one of the best, if not the best, Romney stud regions in the world. This region occupies the rolling country of the Kiwitea-Oroua divide and extends down the western slopes into the valley of the Kiwitea. The region is 700–1200 feet above sea level: it is land high enough and far enough inland to ensure that the sheep have a strong constitution; and the soils and pasture of the area develop sheep to their best advantage. On a five-mile stretch of the Cheltenham-Kimbolton

Road there were eleven stud flocks of Romney sheep with a total of 6,619 stud ewes in 1944. Because of the intensive nature of land use and the comparatively large number of workers required on the stud farms, the density of rural population is high in comparison with the areas to the north.

In the south emphasis is placed on fat lamb production. It is an area of flat to moderately steep country. Farms vary from 200-500 acres, and although the chief source of income is from fat lamb production, dairying and the cash cropping of wheat, barley, and oats are often of equal importance. Cropping is largely confined to the low, rolling land to the southwest of Feilding where climate, soil and surface form favour arable farming.

Land use in the Feilding region is mixed in type, but is at the same time dominantly pastoral in character. Only in the production of stud Romney sheep does the Feilding region achieve individuality in its land use. There is no greater concentration of Romney flocks anywhere in New Zealand. Climate, soils, surface relief and pastures play an important part in the success of this mode of land use, but technical skill and enthusiasm are of equal weight. Land utilisation in the Feilding region is likely to become more intensive as this skill and enthusiasm spread and as still greater advantage is taken of the bounties of the physical environment.

Conclusion

Feilding is an industrial town in so far as the majority of its population depends upon manufacturing for its livelihood. But its industries depend on agriculture, for the factories process only farm products, and its businesses depend for their existence upon the trade of the farmer whose produce the factories handle. Therefore all the functions of Feilding are dominated by the use to which the land of its tributary region is put.

In the Feilding region climate, soil and surface configuration all favour agriculture, but the region has not been exploited to its maximum extent. It may therefore be expected that a much greater agricultural population will ultimately farm this region as the population of New Zealand increases and the potential of its natural habitat is more fully developed. With an increased rural population Feilding will in turn expand, but the character of the town is likely to remain unchanged—that of a representative New Zealand market centre with an industrial bias.

Fig. 10. Over 50,000 sheep in the Feilding saleyards during the February Ewe Fair, 1937. This is one of the largest saleyards in the North Island and the commercial focus of an extensive sheep-rearing region.

[illegible]

THE LAND AND THE FUTURE: A REVIEW AND ARGUMENT*

KENNETH B. CUMBERLAND

THE WAR has not brought significant change in the form and character of New Zealand agriculture other than to accelerate certain trends (such as mechanisation) that were already in operation in the late 1930's. Nor have enormously enlarged wartime demands resulted in appreciable increase in output. This is all the more surprising in view of the fact that other countries—some of them primarily industrial nations, principal 'arsenals of democracy' and sometimes the scene of actual combat—were able to enlarge, reorganise or even to revolutionise their systems of agriculture, and to achieve prodigious increases of output in time of war. In the United Kingdom for example the wartime expansion of agricultural production, estimated in calories, amounted to as much as 70 percent of the prewar level of production—and this was achieved despite the cutting off of imported livestock foodstuffs and the decline in fertiliser supplies.[1] In the United States production increased in six years by 37 percent in value at constant prices.[2] In both of these cases the labour force involved in achieving these swollen outputs was less than in prewar years. In Canada and Australia the wartime history of agriculture and primary production was different not in kind but only in degree. New Zealand on the other hand provides the most noticeable exception to the wartime tendency towards marked agricultural expansion among the foremost non-European exporters of surplus foodstuffs.

UNSATISFACTORY LEVELS OF PRODUCTION

The most recent official statistics[3] reveal an overall increase in the volume of agricultural production in New Zealand of but ten percent between the years 1938-1939 and 1944-1945. Index figures that demon-

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[1] *Proposals for a World Food Board*, United Nations Food and Agriculture Organisation, Washington, 1946, p. 3. It is true that between the wars the livestock-permanent pasture economy had been building up the fertility of English farms. This is widely appreciated, but by itself it is by no means sufficient to explain the wartime achievements of British agriculture.

[2] *loc. cit.* p. 4.

[3] *Monthly Abstract of Statistics*, N.Z. Dept. Census and Statistics, March 1947.

trate wartime changes in the volume of production of the major items oming from the Dominion's farms are presented in the accompanying able. The average output of the three seasons 1938-1939, 1939-1940 and 940-1941 is used to illustrate the extent of the production of these items uring the immediately prewar and early war period, and the average f the production seasons 1943-1944, 1944-1945 and 1945-1946 is mployed to represent the height of the wartime and immediately ostwar achievement. The table shows that the output of wool and of

TABLE I

ERCENTAGE WARTIME CHANGES IN THE VOLUME OF AGRICULTURAL PRODUCTION IN NEW ZEALAND

verage of the three years	Butterfat	Wheat Acreage	Wheat Yield	Number of Cows in Milk	Total Number of Cattle	Total Number of Sheep	Total Number of Pigs
38-39 39-40 40-41	100	100	100	100	100	100	100
43-44 44-45 45-46	90	69	80	95	103	106	82

	Volume of Creamery Butter	Volume of Cheese	Volume of Greasy Wool	Number of Cattle Slaughtered	Number of Sheep Slaughtered	Number of Lambs Slaughtered	Number of Pigs Slaughtered	Official Index: Volume of Total Agricultural Production
38-39 39-40 40-41	100	100	100	100	100	100	100	100 (1938-9)
43-44 44-45 45-46	88	95	110	104	109	106	74	110 (1944-5)

ttle, sheep and lamb carcasses expanded a little. On the other hand, itterfat (together with creamery butter and cheese), pigs slaughtered, d wheat yield all decreased appreciably; and these decreases are the flection of parallel falls in the number of cows in milk, of total pigs, d of acres in wheat. In 1946-1947 the Dominion wheat acreage ached (with three exceptions) its lowest level for over seventy years: in 44 the number of cows in milk and of total pigs reached their lowest vels for twelve and thirteen years respectively. Sheep and sheep oducts alone among the principal elements of the New Zealand agricultural economy have shown significant increases in recent years; and the number of sheep and lambs shorn is now at an alltime high record. But this expansion in sheeprearing has been accomplished only at the expense of dairy farming, and from Northland to Southland have come reports of the disbanding of dairy herds or of the closing of factories. With the prevailing high prices for wool, the shift from dairy cows to sheep will no doubt be accelerated. Meanwhile many minor items of agricultural production—some of them new ones—have begun to contribute to farm incomes. Tobacco, linen flax, linseed, peas, beans, green vegetables and small seeds of many kinds all occupied increased acreages during the war. How many of these will retain their enhanced role in the postwar economy of the Dominion's farms is still extremely doubtful. Already the recently attractive financial return from grass and clover seeds is in marked decline, and linen flax has already virtually disappeared from the statistical array of arable crops. In any case all such items together have relatively little economic significance beside any one of the major products of New Zealand farms.

Reasons for Non-Expansion of Output

This generally unsatisfactory wartime progress cannot be said to be due entirely to labour shortages. During the war it was too often claimed that primary production failed to expand because of the withdrawal of manpower from rural industries. Statistics however reveal that during the period 1936-1945 the farm labour force increased by eight percent, or 12,000 persons. In 1945 the primary industries still gave employment to 26 percent of the employed population. (Thirty-four years earlier the corresponding figure was no more than 32 percent.) And while the farm labour force increased by eight percent, the number of agricultural tractors expanded by more than 200 percent, electric motors on farms by more than 100 percent, shearing machines by more than 55 percent and milking machines by over 30 percent. In view of these weighty considerations, the relatively stagnant or stable position of overall farm production, and the decrease in the numbers of certain classes of livestock and in the acreage of the more important crops, are all the more surprising. The explanation of the paradox is not readily apparent.

There is in any case no single or simple explanation. The dearth of artificial fertilisers is perhaps the most obvious and concrete reason. The area of land in occupation continues to decline, while the acreage f occupied land returned as in 'fern, scrub and second growth' expands ontinuously. These are cogent reasons for the failure of production keep pace with the rate of mechanisation, the growth of the farm bour force, the improvement of livestock, crops and grasses, and the onstant advance of agricultural techniques. Yet while cogent, these aterial reasons are in themselves not sufficient. There are others, but ey are less apparent and less readily subject to scientific measurement.

There are no statistics to demonstrate the acreage of pastureland at is annually invaded by weeds, and thus withdrawn from pro-uction: there are no reliable data to reveal clearly the area of farmland at is occupied each season by manuka, fern, piripiri and tauhinu in the illy sheep country of the North Island, by sweet briar, cotton plant, aori onion and catsear in the mountainous tussock high country, by ushes, thistles and ragwort in the dairying districts, or by a host of inor weeds in the cropping areas. Still more difficult is it to estimate e insidious drain which soil erosion makes on agricultural production. ome two-thirds of the Dominion's occupied land is affected to some egree by a particular combination of the many unusual forms of celerated soil destruction that are found in New Zealand.[4] There is bundant evidence pointing locally to the reduced productivity that sults from the cancerous spread of soil erosion.[5]

As yet little has been done on a sufficiently comprehensive scale to ure the sickness of the land that produces both soil erosion and the nchecked advance of weed invasion: little is being done to investigate e disease or to study its symptoms. But while there is evidence that fficial agencies are now convinced of the urgency of soil conservation d are preparing to operate remedial measures, there is little to show y dominion-wide appreciation of the threat of weeds to the main-nance of even present not wholly satisfactory levels of production.

On the other hand, farmers have long alleged that a higher reward ould have enlarged the wartime effort and expanded production. hatever weight, if any, must be attached to this allegation is uncertain. ore certain is it, however, that many much more complicated olitical, social and economic factors have combined to exert direct and

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. B. Cumberland: *Soil Erosion in New Zealand: A Geographic Reconnaissance*, 2nd edit., Wel-ngton, 1946.

ee for example H. Guthrie Smith: 'Grassland Evolution at Tutira', *N.Z. Journ. Agric.*, Vol. 60, o. 2, Feb. 1930; W. P. Packard: 'Lake Coleridge Catchment: A Geographic Survey of its roblems', *N.Z. Geographer*, Vol. 3, No. 1, April 1947, pp. 19–40 and K. B. Cumberland: urning Tussock Grassland: A Geographic Survey', *N.Z. Geographer*, Vol. 1, No. 2, Oct. 45, pp. 149–164.

indirect influences on the productivity of New Zealand agriculture. Most serious of these perhaps is the lack of any definite goal, specific plan, or firm encouragement for the Dominion's first and foremost industry, together with a want of political interest in, and declining political influence of, the rural areas of the Dominion. While manufacturing has been accorded many incentives during the last decade, and has expanded phenomenally within the framework of a plan which provides protection and subsidies and other forms of encouragement, agriculture has by comparison languished without plan, programme or prospects.

Policy and Intention

If the recent report of a committee of the House of Representatives[6] in any way reflects the ideas, hopes or intentions of the administration, then the future of agriculture in New Zealand is no more promising than its recent past. But the report is itself contradictory. It early and insistently emphasises that the rapid mechanisation of agriculture has not led to a decline in the employment of labour therein, and points out that population on farms continues to expand at a rate but little less than that of the Dominion as a whole. The number of wage earners on the land has increased since 1901 more rapidly than the male population of the country. The proportion of the employed population engaged in the primary industries remains remarkably steady, and the number of persons engaged in farming per occupied holding has risen from 1.57 in 1926 to 1.78 in 1945. Yet resting its conclusions on the evidence of the Department of Lands and the National Employment Service (and not on that of the Department of Agriculture), the committee holds the view that there are no more than '250,000 acres available for settlement . . . . . and 169,000 acres undeveloped but capable of development, a total of approximately 420,000 acres', and that even if there is any increase in the cultivated land 'mechanisation . . . will offset very largely any increase in the demand for permanent labour'. As a result there is 'no necessity to organise the immigration of either agriculturalists or agricultural labourers'.

It is a narrow—an extremely pessimistic, misleading and thus valueless—view that sees possibilities of expanding agricultural production and employment only in terms of bringing Crown Land into

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[6] 'Report of Dominion Population Committee', *Appendices Journ. House of Representatives*, N.Z. Parliament, 1946 [I 17].

roduction, and that ignores the very much larger area of private and
ative land not in production. It is similarly unhelpful to avoid con-
deration of the hundreds of thousands of acres in 'scrub, weeds and
econd growth', or to overlook the ravages of soil erosion, the rural
nanpower needs if these are to be countered, and the increased pro-
uctivity that has been shown to accompany soil conservation.[7] It is
uite unrealistic to reach conclusions concerning the future needs and
naracter of New Zealand agriculture without consideration, or even
assing mention of the world's very real food needs and dietary
eficiencies.

WORLD FOOD OUTLOOK

To justify its conclusion that 'steps should be taken to secure
nmigrants suitable for secondary industrial work', the parliamentary
ommittee finds it necessary to take account of 'the world shortage in all
ypes of consumable commodities together with the very greatly
creased purchasing power in the hands of the public'. It fails, however,
realise that of all the 'consumable commodities' of which the world
short, the first, foremost and most fundamental is food. It also fails to
alise that while New Zealand is committed in terms of the United
ations Conference on Food and Agriculture (Hot Springs) and
rough its participation in the United Nations Food and Agriculture
rganization (FAO) to maximise its food production, it is under no
ch obligation to expand the production of cosmetics, fancy apparel or
a shell trifles. It gives no attention to the fact that by natural endow-
ent, tradition and available domestic skills New Zealand is better
uipped to produce food than manufactured goods.[8]

Only by assuming that all postwar attempts at international co-
eration must fail (and especially all efforts to remove barriers to trade,
stimulate international exchange of the surpluses that must be
oduced by international specialisation of function, and attempts to
pand world consumption as well as production) can one be pessi-
istic about the future prospects of New Zealand agriculture. The
orld needs so much more food than is in sight, and the better-fed
tions still need so much more of the health-giving, protective foods

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. H. Bennett: 'More Food with Soil Conservation', *Soil Conservation*, Vol. 8, No. 7, Aug. 1943.
his question was discussed earlier in a similar context. See K. B. Cumberland: 'New Zealand
d the Post-War World', *Agenda*, Vol. 3, No. 1, Feb. 1944, pp. 33-42. The nature of New
aland's moral duty and international commitment to aid in attempting to satisfy the world's
nger is described in *idem*, 'The World's Food', Canterbury Agricultural College *Rural Education*
lletin, Vol. 2, No. 9, 1947, pp. 2-6.

that New Zealand is so well equipped to produce that expansion is inevitable if methods are devised of ensuring that the much enlarged surplus will be made more readily available where it is required, and providing no domestic handicaps to a healthy agriculture are imposed. And expansion need not rest on the subjugation of Crown Land still unoccupied.

Dairying: Prospects and Potentialities

It has recently been demonstrated that the dairy industry, already the most efficient of New Zealand's agricultural activities, could expand production on land already in dairy farms by no less than fifty percent 'in a comparatively short period'.[9] This not over-optimistic claim is based on the assumption that the steady increase in the carrying capacity of dairy pastures will not slow down for some time in view of the scope for a still higher average attainment in pasture management, and the wider employment of certified pasture grasses. It is also based on the obvious need for increased per cow production of butterfat. If the production of butterfat per cow in New Zealand could be lifted to the level of attainment of the Danish farmer, that in itself would increase production by over twenty percent. Production could also be markedly increased if breeding and selection were put on sounder lines, or if diseases which are rife in New Zealand herds could be even partially removed. It is claimed that contagious abortion alone is responsible for an annual loss of twelve million pounds of butterfat; and mastitis causes an even greater proportion of total annual herd wastage than abortion. No matter what the extent of future farm mechanisation, it will still require a swollen farm labour force to handle pastures, stock and production when the dairy industry moves towards the much greater efficiency which is possible and in view. Nor does increased efficiency and production of this order require an extension of dairy lands: still less does it necessitate an invasion of unoccupied Crown Land.

Yet there is much land in the Dominion that is unoccupied, or occupied and seriously underused if used at all, or devoted to less intensive forms of agriculture, that could be used to carry high densities of dairy cows. Northland provides one example. The Annual Report of the Soil Survey Division of the Department of Scientific and

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[9] W. M. Hamilton: 'The Dairying Industry in New Zealand', *N.Z. Dept. Sci. & Industr. Res. Bull.* No. 89, 1945.

Industrial Research for 1939–1940 estimated that of the 3,330,000 acres of land north of Auckland, almost one million acres have soils and surface configuration suitable for either dairying or fat lamb raising. If this land were made to carry dairy cattle at an average rate of one cow to every two acres, the region would support a dairy cow population of almost half a million, or twice as many as at present. This represents a potential increase in output of dairy products of 100 percent without making any allowance for increase in carrying capacity on existing dairy farms, or for higher per cow production (which in Northland is relatively low), or for improvement in the health of present herds. Although Northland is one of the Dominion's few remaining 'pioneer fringes', it is not the only one. Still less is it the only agricultural region in New Zealand in which a large area of farm land is underused. It shares that doubtful privilege with most others including amongst them some with a much longer history of agricultural production.

And there are more intensive forms of agricultural production than dairying. With these New Zealand has little experience. Less than 20,000 acres are in orchards, and even this diminutive acreage has declined by 32 percent in the last thirteen years. Until the wartime demand for fresh, canned and dehydrated vegetables for military forces in the Southwest Pacific, a mere 7,000 acres sufficed to satisfy the demands of a domestic diet inadequately furnished with fresh protective green and other vegetables. With the establishment of state-operated vegetable farms during the war, this acreage was rapidly doubled. But these farms have since been withdrawn from the production of vegetables, and there are again insufficient vegetables available to meet the demands of canners for the domestic market. When, if ever, the world requirements of staple grains and other principal foodstuffs are fully supplied, there will still remain an unsatisfied demand for health-giving fruit and vegetables if ample diets are to become healthy diets. Few parts of the world can produce better deciduous fruits or vegetables than New Zealand.

AN OFFICIAL VIEW OF THE FARMING FUTURE

Observers with other than a narrow and selfish national attitude are appreciative of the fact that this is 'one world', aware of the immeasurably limitless needs of our 2,200,000,000 'near neighbours' in it, and convinced that no nation may live long unto itself. Believing that the highest possible living standards for all men are only to be obtained by international specialisation of production and freedom of world trade, New Zealanders will be compelled to give more attention to the authoritative pronouncements of the Department of Agriculture and of eminent agriculturalists and demographers than to the hasty conclusions of parliamentary committees in forming balanced judgments as to the future of New Zealand agriculture and its prospective labour needs. It is perhaps not insignificant that the report of the Dominion Population Committee makes no mention of the evidence presented to it by the Department of Agriculture[10] other than to list it along with all the other submissions in an appendix.

We might correctly assume that the Department of Agriculture is better able to understand the future needs, future capacity and future productivity of the land than the Department of Lands or the National Employment Service. It is in an enviable position in that through its Fields Division and experimental agencies it is in constant touch with the needs and problems of farmers throughout the country. It knows their requirements, their abilities and their deficiencies. It is best able to gauge the potentialities of the land already in farms. And the Department of Agriculture is not prone to over-optimism. Assuming policies of full employment, progressively rising standards of nutrition and enhanced levels of world trade, the department recently presented evidence before the Dominion Population Committee to show that the permanent labour required on New Zealand farms will rise by almost 80,000 in the next twenty-five years.[11] This represents a 50 percent increase over prewar figures of farm employment. Such expansion of the agricultural labour force (and of primary products for export) will take place principally in the traditional fields of grassland and livestock farming. It will include first and foremost 'a rapid improvement in the *developed* lands of the Dominion'. Emphasis is put upon the better use of existing farm lands. It is demonstrated that, with the wider use of lime and fertilisers, improved strains of grasses and clovers, and more adequate and efficient feeding of stock, very large areas are capable of much increased production. Over half a million acres in the South Island are to be irrigated during the period of the estimate. The department's very conservative estimate suggests that these are capable of adding 'at least a million ewes' to breeding flocks for the production of fat lambs, and of providing much scope for closer settlement.

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[10] *Notes on Possible Trends in Farming during the Period 1945-1975*, Copy of Verbatim Evidence presented by the N.Z. Department of Agriculture to the Dominion Population Committee, 1946, pp. 11. (Cyclostyled).

[11] *loc. cit.* p. 6.

The Future of Hill Country

The department's submission gives due weight to the importance in the farm economy of New Zealand of the hill pasture lands of the Dominion. Production on the most intensively farmed lands would suffer disastrously if the supplies of store and breeding stock from the hill and mountain pastures were to decline further. The stabilisation of production on the tussock grasslands of the South Island and on the surface-sown hill pastures of the North Island is a problem of fundamental significance. This brings us face to face with the even wider problems of weeds and soil erosion discussed earlier. Nobody has yet attempted to estimate the labour requirements of the large-scale reclamation work inevitably involved. The department, however, assumes that it will be 'heavy'.

Development of new farm lands, assumed by the parliamentary committee to be the only way of increasing farm production and of avoiding a decline in farm population, is given only secondary consideration in the evidence submitted to the committee by the Department of Agriculture but ignored in the committee's report. While the committee concludes that there are in the Dominion '169,000 acres undeveloped but capable of development', the department shows that in the gumland scrub areas of North Auckland and the pumiceland of the Rotorua-Taupo area alone there are '200,000 to 300,000 acres of suitable land'—suitable that is for 'complete development into economic units as dairy farms'. The department does not bother to estimate what might be developed for other farming purposes. Drainage, however, it claims, would in many areas enable land to be reclaimed for farming; and it quotes one example, the Lake Wairarapa scheme, which would provide for the settlement of 200 additional families of dairy farmers.

The Department of Agriculture is also fully aware of the advisability of promoting where possible other than traditional lines of primary production, and especially those intensive forms of agricultural activity which require a high application of labour per acre. Diversification has much to commend it; this is especially the case when it is realised hat there are so many agricultural products which, if locally available ould do so much to improve the ample but nutritionally-deficient iet of New Zealanders. In these respects the department finds that there is 'immediate scope for expansion'. There are 'now' openings for the establishment of about 1,100 one-man units in fruit (presumably small fruit), vegetable, egg and honey production. In addition the availability of nursery stock at a later date will allow of the expansion of orcharding. The nursery industry itself could absorb 200 workers immediately. The production of lawn and pasture grass seed, vegetables and vegetable seeds, bulbs, nursery stock, fruit, eggs, honey, flowers, table poultry and many similar products normally in short supply on home and, in some cases, overseas markets are all intensive enterprises calling for heavy applications of labour, more productive use of the better land, closer subdivision and denser settlement. Many of the developments the Department of Agriculture finds desirable will provide employment for seasonal labour as well as the permanent labour allowed for in its estimates quoted above.

OTHER VIEWS

This weighty official opinion is reinforced by that of independent students of these problems. In a detailed scientific survey of the future population needs and prospects of the Dominion,[12] it was also suggested recently that the expansion of the country's farm labour force by one third is not only possible but desirable. In a considered review of the future of the Dominion's farms, one of New Zealand's foremost agriculturalists has also recently claimed[13] that the land 'is capable of greatly increased production', that 'a great many holdings are in bad order owing to the lack of skilled workers', and that if 'the care of the land, its conservation and its beautification are to take precedence over its exploitation . . . . our rural population must be much greater'. And the following mature opinion runs counter to the attitude of the Dominion Population Committee which measured the future 'expansion' of New Zealand agriculture almost solely in terms of unoccupied Crown Land available for settlement: 'It is very doubtful whether it is wise to develop additional unimproved land much of which is not of first quality . . . . There are still large holdings which could be subdivided with advantage . . . . . in many instances where land is not being effectively utilised it should be repossessed . . . . . and inefficient farmers should be replaced by more competent men. Until we are making full use of our better soils, instead of developing additional land we should probably be more justified in putting some areas out of production so far as agriculture is concerned.'

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[12] G. N. Calvert: *The Future Population of New Zealand: A Statistical Analysis*, Wellington, 1946.

[13] E. R. Hudson: 'The Future of Farming', N.Z. Inst. Internat. Affrs. *Reconstruction Series*, No. 6, n.d. [1944?].

It would not be an over optimistic or unjustifiable deduction from the ample evidence available to conclude that it is possible to increase the overall New Zealand contribution to the world's requirement of food and agricultural raw materials—wool, hides, skins, tallow—by not less than 50 percent within the next generation. To do this a farm and rural population of from 35 to 50 percent greater than that of the war years would be necessary. Per capita production levels would necessarily decline for the greater part of this period because the early increase in the labour force would be reflected not in an immediate increase of exportable produce on the wharves, but in the restoration of many farms to a state of maximum productive efficiency and health. There would appear to be no reason however why, towards the end of this period of expansion and improvement, per capita levels of production should not be restored and even exceeded, for we cannot assume that the advance of technology is complete; it has merely begun.

Auxiliary and Related Problems

Today New Zealand enjoys a better balance between industry and agriculture, between urban and rural patterns of living, than most other nations. This arrangement is desirable on both social and medical grounds. To insist that New Zealand is better equipped to produce food and agricultural raw materials than it is to furnish finished manufactured goods, or to urge that prior attention be given to the encouragement of agriculture than to the further artificial stimulation of secondary industries, is not to imply that this balance must be disturbed, or tilted again heavily in favour of agriculture. It does however indicate the most appropriate direction in which manufacturing industry might expand to the greatest advantage of New Zealand and the rest of the world. If, in the next twenty or thirty years, the Dominion is able to increase the volume and extend the range of its agricultural production, this will almost of necessity involve a corresponding expansion and diversification of secondary industries. As science progresses food production becomes more highly industrialised, and the provision of exchangeable surpluses of food entails more and more farm machinery and more and more mechanical and industrial processing. There is no reason to suppose that with the operation of a programme of agricultural development (involving possibly the encouragement of immigration of farmers and farm workers) the ratio of agricultural workers to workers in other pursuits (1 : 3.16) will be noticeably changed. On the other hand, with the continuation of agricultural neglect and of encouragement to uneconomic secondary industries, the pendulum must swing unhealthily in the other direction. Such a swing would have many unhappy consequences, some of which are already apparent. Excessively rapid industrialisation and urbanisation during the 'abnormal' years of hostility have recently brought them to our notice: acute urban housing shortages, electric power and coal shortages, overburdened transport facilities, rising costs and falling standards of living, and most fundamentally significant perhaps, a relative and absolute decline in rural productivity and population in many country districts and especially in the South Island. The broad agricultural base upon which the well-being and living standards of all New Zealanders ultimately rests is being appreciably narrowed, so that the swelling superstructure of (often artificial) industrial and urban development becomes increasingly topheavy.

To give first place to the hastening of these processes, as the Dominion Population Committee does in insisting on the immigration of industrial workers while denying the need for or possibility of enlarging employment on the land (our one and only considerable economic resource), is to put the cart before the horse. The horse is at the moment in no too fit a state. It is doubtful whether it can pull along a heavier cart. If, however, we feed the horse a little better and give it our first attention and set it off on the right road, it will pull the cart along and the cart will survive the journey unimpaired.

It has taken a war to remind us and nakedly to reveal that this is a hungry world. Some 1,200,000,000 people in it have a food supply which is less than a quarter as adequate or satisfactory as that we enjoy in New Zealand. Food will remain a world priority for a long time to come if serious attempts are made to give underfed millions a better diet and more ample food. New Zealand is able to contribute a not insignificant proportion of the increased output of primary products necessary to do this. It has reason to be more directly concerned with the proposals and actions of FAO than most other nations. It has good cause for adopting as its maxim the suggestion of the late President Roosevelt that 'each nation individually and all nations collectively . . . . must take all necessary steps to develop world food production . . . . . They must see to it that no hindrances . . . . . be allowed to prevent any nation or group of citizens within a nation from obtaining the food necessary to health'.

A Programme

To this end New Zealand would appear to need first and foremost an overall forward-looking agricultural plan that insists primarily on giving the land greater care and attention. This plan would have as its cornerstones increased and diversified production from the land now in farms; the encouragement of more intensive practices and economics; reclamation of land gone to weeds; rehabilitation of eroded farms where such rehabilitation by simple soil-conserving techniques is economically feasible; afforestation or other extensive use of depleted grasslands and slipping hillsides where the deterioration of these has already gone beyond the bounds of possible resuscitation for agricultural production; rapid installation of further irrigation facilities; subjugation of gumland, pumiceland, swampland and the extension of the frontier of agriculture and rural settlement wherever reasonably possible; the expansion of rural amenities, including housing, roading and electricity reticulation; and the active encouragement of farm settlement, including the removal of barriers, difficulties and official discouragement to the immigration of farmers and farm workers. Such a programme means more farmers, graziers and foresters on the land of New Zealand; but it also implies more workers in secondary and tertiary industries. And there are necessary corollaries to such a programme. It will be necessary to so direct the establishment of new and enlarged processing industries as to avoid further urban congestion and continued drift to the North Island. The careful distribution of future industrial plant amongst the rural townships of the Dominion will be facilitated by the rural origin of raw materials, the further development of road transport and the planned availability of hydroelectric power. The growth of rural industries and of secondary industries in rural surroundings will both facilitate enhanced standards of living in country districts and foster the extension of rural comforts and amenities. They will alone ensure the continued progress and prosperity of our cities and city folk. Town planning will further help to give these programmes definition.

It should be emphasised in conclusion that these estimates of the agricultural potentialities of New Zealand are largely of a technological nature. They are based principally upon the considered opinion of individuals and of departmental officials in touch with the problems discussed. Unfortunately strictly scientific studies have not yet been made of the potentialities of the land in New Zealand that cover the whole country or the whole range of agricultural activities and problems. Detailed analyses of the country's agricultural prospects, even from a purely technological point of view, have been made in the case of but few areas and few branches of the agricultural industry. The most urgent need is to extend the scope of such surveys and to enlarge, by painstaking study and research, the factual basis upon which really valuable estimates may be made. The present suggestions can be no more than tentative.

In any case they necessarily make very many basic assumptions, especially political and economic assumptions about the future of world trade, living standards and markets. It is, for example, assumed that real efforts will be made to allow the United Nations in all its many aspects to function to the full. Such assumptions unavoidably affect the value of estimates such as those used here, and seriously qualify their validity. They are, however, the only assumptions that under the circumstances can legitimately be made. No other assumptions would enable us to reach conclusions of greater merit and validity. To this extent they are justifiable.

It has been clearly demonstrated both officially and unofficially that New Zealand is itself anxious to take part in outlining and ensuring the attainment of major postwar international objectives. The Dominion is deeply committed to such policies. It is upon the success with which New Zealand first discharges its domestic responsibilities that its achievements in the international sphere will depend and largely be measured.

NEW ZEALAND GEOGRAPHICAL SOCIETY: BRANCH AFFAIRS

Canterbury Branch

Officers for 1947 are— *President*: Mr. D. McLeod
Vice-Presidents: Mr. A. E. Flower, Mr. J. L. Hay, Mr. J. Acland
Chairman: Professor G. Jobberns
Secretary-Treasurer: Mr. A. C. Pitcaithly *Hon. Auditor*: Professor A. H. Tocker
Recorder: Mr. J. L. Hewland
Committee: Miss G. Ulrich, Mr. G. H. Lawton, Mr. L. L. Pownall and Mr. Y. T. Shand

The following programme was presented during the year: 'A Trip to Petra' by Mr. H. Cordery; Presidential Address, 'High Country' by Mr. D. McLeod; 'Japan under Military Occupation' by Dr. I. L. G. Sutherland; 'The New Zealand Geographical Society—its Progress and Purpose' by Mr. B. J. Garnier; 'Wanderings in the Andes' by Dr. H. Money; 'Whangarei County' by Dr. W. M. Hamilton; and papers by Honours Students of the Department of Geography, Canterbury College.

We offer our sincere congratulations to Mr. K. W. Robinson upon his appointment as Assistant Lecturer in Geography in the University of Otago, to Mr. L. L. Pownall who has been awarded a Whitbeck Scholarship for postgraduate research in the University of Wisconsin and to Mr. C. R. Bradwell who, as holder of an American field service scholarship, will study history and world affairs at Dickinson College, Pennsylvania.

Wellington Branch

Officers for 1947 are— *President*: Dr. J. T. Salmon
Vice-Presidents: Dr. P. Marshall, Dr. W. R. B. Oliver, Mr. D. I. Macdonald
Chairman: Mr. R. J. Waghorn
Secretary: Miss J. K. Finney *Treasurer*: Miss B. Page
Publicity Officer: Mr. J. W. Brodie *Hon. Auditor*: Mr. T. L. James
Committee: Mrs. S. S. Turowski, Mr. N. E. Dalmer, Mr. W. B. Harris, and Mr. D. W. McKenzie

This year has been the most successful yet experienced by the Wellington Branch, not as measured by size of membership but by the growth of public interest in our activities and the sustained attendance at both lecture meetings and film evenings. The lecture hall of the Wellington Central Library has been filled to capacity. The addition to the programme of four special film evenings proved extremely popular.

Two public lectures have been held. The first of these was given in the Concert Chamber of the Town Hall, when Dr. H. H. Richardson, a member of the recent Byrd expedition, gave a first-hand account of 'The Antarctic'. The second public meeting was held in New Plymouth when Dr. G. Jobberns spoke on the site, form and function of that town in relation to its hinterland. This Branch has also been in communication with Sir Peter Buck, and it seems likely that he will address a public meeting in Wellington under the auspices of this Branch when he visits New Zealand later this year.

Auckland Branch

Officers for 1947 are— *President*: Professor V. J. Chapman
Vice-Presidents: Professor J. A. Bartrum, Professor C. G. F. Simkin, Mr. L. K. Munro, Mr. H. R. Rodwell, Mr. E. G. Jones

Chairman: Dr. K. B. Cumberland
Deputy-Chairman: Mr. R. A. Watson
Hon. Secretary: Mr. G. G. Harvey *Hon. Treasurer*: Mr. A. W. A. Parkes
Hon. Auditor: Mr. J. K. Bedbrook
Committee: Miss J. Herdman, Mr. E. C. Grayland, Mr. N. Pountney

The following items have been added to the 1947 programme since it was originally arranged: 'The Future of New Zealand Agriculture' by J. E. Bell; 'Nauru and Ocean Island', by Sir Albert Ellis; 'The Inter-Relations of Geography and Botany', by Professor V. J. Chapman. Film evenings have proved extremely popular, and three additional film evenings have been arranged: 'South America', 'Canada', and 'Australia', being the subjects involved.

The membership of the Branch is still disappointingly small; many of last year's members have been remiss in not paying their subscriptions. It is not highly creditable that with almost half the Dominion's population within its district, the Branch has no more members than the Otago Branch. Renewed efforts at forming a sub-branch in Hamilton have met with some success, and a public lecture is to be arranged at a future date.

We extend a welcome and offer congratulations to Messrs. R. G. Lister and J. W. Fox, recently appointed Lecturers in Geography at Auckland University College.

OTAGO BRANCH

OFFICERS for 1947 are— *President*: Dr. B. Howard
Vice-Presidents: Mr. P. G. Connolly, M.P., Mr. B. J. Garnier, Mr. G. Simpson
Mr. A. J. Sligo
Chairman: Mr. E. Hayes
Hon. Secretary-Treasurer: Mr. A. H. Payne *Hon. Auditor*: Mr. G. S. Kirby
Committee: Mrs. R. R. McNeill, Miss J. McKenzie, Miss D. M. Martyn,
Mr. G. D. Anderson, Mr. N. Dew, Mr. D. Sage, Mr. J. C. Smith

The following lecture programme has been presented this year:

'Geography Teaching in American Universities', Mr. G. Lawton; Film evening—'River of Canada', 'This is Our Canada', 'Canadian Landscape', 'Alexis Tremblay, Habitant' (commentaries were by Messrs. G. D. Anderson and A. H. Payne); 'Glaciation of Otago', Dr. C. O. Hutton; 'Industrial Minerals and Rocks in New Zealand', Mr. R. W. Willett; and 'Iron and Steel Industry of Australia', Mr. H. Muir.

On 31 July, the Otago Branch held its first public meeting in the R.S.A. Hall. On this occasion Mr. L. W. McCaskill, Lecturer in Rural Education, Canterbury Agricultural College, dealt with 'Some Land Use Problems in New Zealand'. The Presidential Address will be given later in the year by Dr. B. H. Howard.

Members of the Branch congratulate Mr. G. D. Anderson, formerly Education Officer, Otago Museum, on his appointment to the Lectureship in Geography at the Wellington Training College. Since his departure the editorship of our newsletter has been taken over by Mr. B. J. Garnier. In the early part of the year the Branch also lost the service of Mr. A. J. Sligo who left Dunedin to take up a senior appointment on the staff of the Hutt Valley Technical College.

The Geography of Otago is in active preparation, and in other ways also the Branch is planning to make its contribution to the Otago Centennial Celebrations next year.

EXTERNAL AFFAIRS. The New Zealand Department of External Affairs is performing a particularly valuable public and educational service in issuing from time to time attractively prepared brochures explaining its point of view at international conferences, summarising the agreements reached and outlining the commitments entered. Together these papers furnish a valuable background for the study, from the New Zealand viewpoint, of a *Geopolitik* which seeks not the political aggrandisement of one state and the world domination of a chosen people, but which is objective in outlook and seeks to assure 'the political, economic, social and educational advancement' of all peoples according to the tenets of the United Nations.

Two recent statements are of particular interest to students of the political geography of the Pacific. One sets out in formal fashion the trusteeship agreement for Western Samoa which was approved by the General Assembly of the United Nations in December 1946 ('Trusteeship Agreement for the Territory of Western Samoa', *N.Z. Dept. Ext. Affairs Publ. No.* 32, 1947). The report has a brief but valuable 'explanatory note' and an appendix setting out the text of Chapters XII and XIII of the Charter of the United Nations which define the trusteeship system and the composition and functions of the Trusteeship Council. No document could illustrate more clearly the enlightened geopolitical objectives of the United Nations, and the enthusiasm with which New Zealand subscribes to them and seeks actively to promote them in the territories under its jurisdiction.

The second paper ('South Pacific Commission', *N.Z. Dept. Ext. Affairs Publ. No.* 26, 1947) is an even more attractive and readable document. It is a lengthy report of the proceedings of the South Seas Commission Conference (and of its various committees) held in Canberra in January and February 1947. The conference was attended by representatives of the Governments of Australia and New Zealand (the inviting and initiating powers) and of the United Kingdom, the United States, France and the Netherlands. The report describes the aims, purposes, views and achievements of the conference and sets out at length the twenty-one articles of the 'Agreement Establishing the South Pacific Commission'. The proposals of the conference will have particular interest for the geographer in two major respects: the adoption of a general regional approach to the many problems of 'the non-self-governing territories in the Pacific Ocean which are administered by the participating Governments and which lie wholly or in part south of the equator and east from and including Netherlands New Guinea' together (it is hoped) with the Kingdom of Tonga; and the establishment of a research council arising out of the fact that 'all delegations were agreed that perhaps the most important aspect of the Commission's work would be concerned with research'. Appendix D of the report (pp. 33-35) records a resolution of the conference concerning immediate projects for the Commission's attention, and lists its proposals under the headings 'Agriculture', 'Economics', 'Education and Social Development', 'Fisheries', 'Forestry', 'Health and Medicine' and 'Labour'. It is a comprehensive and impressive programme of research, and includes a number of specific items and problems in the study and solution of which the training and techniques of the geographer could be of very great value. The items mentioned in the resolution embrace, for example, such essentially geographic problems as 'the study of the relationship between plants and their environment including soils and climate', surveys of native industries, land utilisation, fisheries and trading systems, of social life and of 'the relationship between forests and water conservation and soil conservation'. The sooner the Commission can be established the better. It promises a much brighter future for many island peoples. The Australian and New Zealand Governments deserve the commendations both of the peoples of their home territories and of the thousands of island communities affected for having, as an outcome of earlier deliberations (which led to the so-called Canberra Pact), taken the initiative in seeking to extend to the southwest Pacific benefits which have already accrued to the peoples of the West Indies as a result of the regional co-operation of the United Kingdom and the United States following the establishment of the Anglo-American Caribbean Commission in 1942.

M.A. THESES IN GEOGRAPHY. It is perhaps significant that, of the twenty-three theses presented for the M.A. Degree in Geography in the University of New Zealand in the five years since postgraduate courses were first offered at Canterbury University College, no less than six were presented last year. It is also indicative of the activity in geographic research that in the one college another nineteen theses are being prepared by prospective candidates for the postgraduate degree. In the near future when other colleges offer postgraduate courses it will become increasingly difficult to keep track of the work accomplished and of that in progress, and increasingly important that research workers in the field should have at hand a complete and reliable list of the theses reports presented to the university. It is with this in mind that the situation at the moment is set out below. It is intended to bring the list up-to-date from time to time.

Theses presented for the Degree of M.A. in Geography in the University of New Zealand:

1941 The Progress of Land Utilisation in Waimairi County, Joyce K. Finney;
Kiwi Station, Wairoa, Hawke's Bay, Helen Hodgson;
An Historico-Geographic Survey of Banks Peninsula, Patricia Milligan;
A Reconnaissance Traverse of the South Island from Lake Ellesmere to Kumara, Gwynneth Oldridge;
The Morphology and Origin of the Canterbury Plains, Margarette Oram.
1942 Wanganui City: Its Site, Form and Function, Jean Luke.
1943 The Maniototo Basin, Central Otago, Mary Aitken (see also the *New Zealand Geographer*, Vol. III, No. 1, April 1947, pp. 59-74);
Timaru, Joan F. Drummond.
1944 A Land Use Survey of Paparua County, H. A. W. Gallagher;
Lake Ellesmere and the Utilisation of its Borderland, Betty Macartney;
Geographic Regions in New Zealand, Joanna Muirhead;
Land Utilisation in Metropolitan Christchurch, F. Parks (see also the *New Zealand Geographer*, Vol. II, No. 2, October 1946, pp. 279-314);
Cocksfoot: Its Role in the Agricultural Geography of New Zealand, Peter D. Sears.
1945 The Sequent Occupance of some North Canterbury Downland, Joyce Deane (see also the *New Zealand Geographer*, Vol. II, No. 2, October, 1946, pp. 345-354);
The Nature and Distribution of Manufacturing in New Zealand, J. L. Hewland (see also the *New Zealand Geographer*, Vol. II, No. 1, April 1946, pp. 207-222);

The Wairarapa Region, Ann B. Peacock;
A Method of Land Classification for New Zealand, K. W. Robinson (see also the *New Zealand Geographer*, Vol. II, No. 1, April 1946, pp. 253-259).
1946 Kaituna Valley [Banks Peninsula], A. Barley;
Egmont County, Alice G. Dawson;
Marshlands [near Christchurch], E. I. Ellis;
The Lake Coleridge Catchment, W. P. Packard (see also the *New Zealand Geographer*, Vol. III, No. 1, April 1947, pp. 19-40);
Feilding: A Geographic Interpretation, L. L. Pownall (see elsewhere in this issue of the *New Zealand Geographer*);
The Climates of New Zealand according to the Thornthwaite System, H. M. Sweney.

These theses constitute an interesting and varied list of titles. Two topics have had noticeable popularity with M.A. students; land utilisation and historical geography. The latter has proved even more popular than is apparent from short titles; it has been the central theme of a number of detailed regional studies. Land utilisation surveys have been concerned not only with rural areas but also with urban uses of land; the list includes four studies of urban morphology. The list has two other more apparent features: the natural predominance of the Canterbury region and especially of the area within fifteen miles of Christchurch (although four students have looked beyond Cook Strait for their chosen area of study), and the rather surprisingly insignificant place occupied by physical geography in postgraduate research; only two students have chosen topics within the province of physical geography, one in climatology and the other in geomorphology. Only five theses subjects have dominion-wide coverage. The regions chosen by graduates for intensive regional and historical study are, with possibly one exception, small and often minute areas. One wonders if in so frequently choosing county units, or 'valleys', 'basins' and 'catchments', New Zealand geographers are not avoiding some of the main and most stimulating problems presented by the study of regional geography. At this infant stage in the development of original research in the geography of the Dominion it is strange that problems of nation-wide extent have not more frequently attracted the attention of students; and it is of interest to note that it is the work of those few students who have been bold enough to attempt preliminary investigation of dominion-wide problems in the fields of agriculture, land utilisation and manufacturing that has attracted most attention and proved of greatest value to the undergraduate student of geography.

NEW ZEALAND TIME. It is evident that many New Zealanders believe that the clock time which is being kept in New Zealand at present is an extension of daylight saving time, and that eventually we will return to our normal prewar time by setting the clock back half an hour. Our present time was made permanent by the Standard Time Act 1945, but there were weightier matters in the news, and the Act attracted little attention. It provided that, on and after 1 January, 1946, New Zealand standard time should be the time corresponding to longitude 180° east of Greenwich, being 12 hours in advance of Greenwich mean time. New Zealand lies wholly to the west of the 180° meridian, so that our standard time is in advance of the local solar time of any place in the country.

In the early days of New Zealand there was no standard time for the whole colony. Each district kept its own time, based on the local mean solar time of its chief town. But as internal communications improved, and settlements began to be linked by railway and telegraph, the adoption of a uniform system became necessary. A proclamation dated 1868 October 30 (*N.Z. Gazette*, 1868, p. 507) prescribed that New Zealand standard time should be 11h. 30m. in advance of Greenwich time on and after 1868 November 2.

This time, corresponding to the meridian 172° 30′ east, was adopted on the recommendation of Dr. (afterwards Sir James) Hector, who set forth the following reasons for the choice (*Transactions N.Z. Institute*, Vol. 1, 1868, 2nd ed., 1875, p. 451): '1st. It is a close approximation to the average longitude for the colony. 2nd. The absolute longitude of any place in the colony has not yet been determined; and it is therefore better for a statute to adopt a meridian as basis, than an approximate longitude of a place which might hereafter require rectification. 3rd. Longitude 172° 30′ east is 11h. 30m. east of Greenwich; and being an even number, will be most suitable for the purpose of enabling mariners to compare the errors of their chronometers on mean Greenwich time; while the adoption of the mean time of place for any town or port in the colony will have no practical advantage.'

We have good reason to be grateful to Hector for the wisdom of his choice, particularly as New Zealand longitudes are not even yet finally determined. Moreover, the practice of observing standard times differing from Greenwich time by an exact number of hours or half-hours was not adopted in other parts of the world until some years later (Sweden followed in 1879, American railways in 1883; and there are still some places where it is not in force), and Greenwich time did not become statutory in Great Britain until 1880.

The time so chosen remained our standard time until the end of 1945, but in the intervening period several suggestions for improvement were made. In 1916, the council of the Wellington Philosophical Society urged the adoption of a standard time 12 hours in advance of Greenwich, and elaborated the reasons for this recommendation in a pamphlet published the following year. The Hector Observatory was already using the suggested time for astronomical purposes, but no progress was made towards its general adoption.

The idea of 'daylight saving', or advancing the clock during the summer months, seems to have been first mooted in Britain about 1907. 'Daylight saving' is perhaps a misnomer, as it is artificial light that is saved, and the scheme was designed to get people out of bed earlier instead of sleeping until well into the daylight, and to give them more time in the evening before artificial light is needed. A bill was introduced in the House of Commons in 1908, but it was not until 1916 that the Act was passed to conserve fuel in wartime. Other European countries adopted a similar measure in the same year, but many of them abandoned the practice when the war was over. In Britain, a permanent Act was passed in 1925.

In New Zealand, T. K. (later Sir Thomas) Sidey introduced his first daylight saving bill in 1909. It was opposed here as in other countries by the farming community, although, when it was ultimately put to the test, many of the difficulties were found to have been exaggerated. Sidey continued to bring his bill forward every year. In 1915, it was passed by the House of Representatives but rejected by the Legislative Council. Eventually, the Summer Time Act was passed in 1927; it provided that the time for general purposes should be one hour in advance of standard time from the first Sunday in November 1927 till the first Sunday in March 1928, the change, in this as in all later instances, to be made at 2 a.m. standard time on the dates concerned. By the Summer Time Act 1928, the difference between summer time and standard time was reduced to half an hour, and the period of summer time was from the second Sunday in October 1928 to the third Sunday in March 1929. Both of these Acts were experimental; permanent legislation was introduced by the Summer Time Act 1929, which provided that clock time should be half an hour in advance of standard time from the second Sunday in October in any year till the third Sunday in March of the following year; the summer of 1929-1930 was the first period to which the new Act applied. The period during which summer time operated was originally five months; it was increased to seven months by the Summer Time Amendment Act 1933. This Act provided that the period of summer time which normally would have ended on the third Sunday in March 1934 was to continue until the last Sunday in April of the same year. Thereafter, the period of summer time was defined as beginning on the last Sunday in September and ending on the last Sunday in April.

As a war measure, the Daylight Saving Emergency Regulations 1941 extended the period of summer time to cover the whole of the year 1941, and similar regulations were made in 1942, 1943, 1944, and 1945. The Standard Time Act 1945, by which all summer time legislation was repealed, and which was passed without opposition, has made this 'war time' permanent.—L. P. LEE.

GOLDEN FLEECE. Wool is in the news. The January issue of *Fortune* contains an illuminating comment on wool production in the United States. The title explains the whole tenor of the article; it is lengthy and runs: 'The trouble with United States wool is that it's uneconomic. The industry subsists on excessive tariffs, wartime subsidies and political shenanigans'. The statement voices the protest of the man in the street, and estimates that through tariffs on raw wool and woollen fabrics, the total extra cost to the consumer may have been more than a billion dollars. Thus there is justice in the claim that 'the United States' public takes a licking'.

American woolgrowers seem to be in a bad way. The sheep belt extends from Texas and California through Utah and Wyoming to Montana. Except in Texas and California, where the industry is more economic, sheep ranching requires much hired labour and this is not easy to get. One 'sheepherder' spends night and day looking after 800 sheep. 'Moreover, the United States grower must hire one assistant to keep two sheepherders and their flocks supplied with food and medicine. Before the war an experienced sheepherder was paid $65 a month for a seventeen hour day, plus board and bare necessities. Now, with or without experience, he wants $150 to $200, an eight hour day, a vacation with pay and a radio. If he doesn't get these things, he goes to work in a factory. An Australian sheepherder makes at most $90 a month with board.' The American sheepman is more interested in fat lambs for slaughter than in wool. Over the war years his income from fat lambs was steady at about $250 million, but his income from wool dropped from $160 million in 1943 to $126 million in 1946. In 1946, however, the United States consumed an estimated 400 million pounds of scoured foreign wool, the levy alone on this costing the American consumer $136 million. If the levy on imported wool exceeds by so much the gross revenue to the home grower, it seems abundantly evident that the country cannot be selfsupporting in wool.

The State Department had wool on its list of items on which tariffs were to be reduced (50 percent in this case), but the growers argued that this would mean the virtual end of their industry, with the costs of production at the present level. With the representatives of thirteen big western states behind them, the western growers have a powerful voice in Washington. In November 1945 Senator Robertson of Wyoming, himself a sheepman, put forward a bill to make the C.C.C. (Commodity Credit Corporation) the sole buyer of foreign as well as of domestic wool for resale to the consumers. Since April 1943, it had been operating as buyer of domestic wool at high prices for sale at prices that would compete with foreign wool. The man in the street had to foot the bill. Robertson's bill did not get to the floor of the Senate, and the most the sheepmen could secure was an extension until April 1947 of the C.C.C. Purchase Plan.

This is as far as the report in *Fortune* takes the matter. It is evident that, in the interest of freer trade, the State Department sees a need for relaxing the stiff import duties, and that the United States public sees itself as the ultimate victim, but that the sheepman has a powerful voice in the Senate. It is evidently this powerful voice that brought a complete reversal of the State Department's move for a 50 percent decrease of the existing tariff to a 50 percent increase. The American public would have had to take a still more severe 'licking' had President Truman not vetoed the proposals in June as this statement went to press. New Zealand, because of its considerable reliance upon exports of wool, and the world, because of its imperative need for freer trade and more abundant exchange of goods, both have reason to be grateful to the President.

SIXTH SCIENCE CONGRESS. To the geographer the most striking feature of the Royal Society of New Zealand's Sixth Science Congress held in Wellington in May this year was the wealth of material of interest to him and the apparently paradoxical fact that only one paper was presented by a research worker trained in geography. So extensive was the list of papers of immediate concern and value to the geographer, that it was impossible for him to arrange a timetable for himself that would enable him to attend even three-quarters of the sessions he desired to attend. The Geography Section itself had a programme of but four papers, on air photography, the New Zealand topographic map, a method of land utilisation survey, and the localisation of market gardening in New Zealand. Under the auspices of other sections, however, there were no less than twenty-five papers directly concerned with geographic problems. It is remarkable how many sections were involved, and how few (if any) did not have on their programme papers of value to geography. These ranged over a very wide field from the rabbit problem to social studies in schools, from forestry practice in Germany to the Ainu people of northern Japan, and from the structure of cyclones to sheep farming in Poverty Bay and the culture of the Fijian. It is a pity that the geographic point of view was not presented to the congress more forcibly, and that geographers were not represented in greater numbers among the active participants in the congress. That this was not the case was in some measure due to the faulty organisation of the official programme of the Geography Section. It is the legitimate task and duty of an organisation like the New Zealand Geographical Society to see that on future occasions of this sort similar shortcomings are not again apparent.

IN OUR CONTEMPORARIES . . .

1. *In New Zealand Journals* . . .

STUDIES IN FARM MANAGEMENT

This series of articles describing individual farm holdings continues to appear irregularly in the *New Zealand Journal of Agriculture*.

1. A Poverty Bay Hill-Country Farm. On the steep hill country of Poverty Bay the initial fertility left by the bush-burn was very rapidly depleted and pastures originally consisting of the best English grasses soon became dominantly danthonia. Such was the position of this farm of 4,000 acres in 1905. The paddocks were very large and the fences in a state of disrepair. The article describes the rejuvenation of the property by means of a policy of subdivision and better stock control. The process was assisted by topdressing with superphosphate and surface sowing of subterranean clover. The cattle-sheep ratio has been altered from 1:19 to 1:6, and the 4,000 acres now carry 6,000 sheep (3,800 breeding ewes) and 1,000 cattle (300 breeding cows). The grazing system has the object of controlling facial eczema and involves the use of special perennial ryegrass-free pastures, or of fodder crops and mature feed in the dangerous months of January, February and March. Soil erosion, once serious, has been reduced with the increase in the cattle-sheep ratio which allows of the maintenance of a dense thick pasture cover. The construction of débris dams in the gullies and systematic planting of willows and poplars on moving country have both paid dividends.

2. An Otorohanga Dairy Farm. Otorohanga County has made remarkable progress in the past 20 years. During that time the number of dairy cattle has doubled, total cattle have also doubled and the number of sheep has risen from 20,000 to 200,000. (The increasing importance of sheep farming is due largely to the invasion of ragwort which has forced many dairy farmers to turn to sheep to keep their pastures clean.) The dairy farm described, one of 130 acres, had been farmed on the 'robber' system to such an extent that when the present owner took it over in 1924 it could carry only 50 dairy cows producing an equivalent of 235 pounds of butterfat per cow. Today the same area carries 74 cows with a fat production of 360 pounds of butterfat, 48 young stock for replacements and a large pig population. The improvement is due to the consistent adherence to well-known principles such as the early cutting of hay nd silage (to ensure a good aftermath before the dry weather), the planting of adequate shelter, the careful selection and rearing of young stock and careful attention to pasture management (controlled grazing, harrowing, topdressing and not too frequent haying of the same fields).

3. A Waikato Peat Farm. There are over 40,000 acres of peat in the Waikato Basin and its reclamation for dairy farming presents numerous hazards. Problems and ifficulties are associated with drainage, stump removal, pasture establishment and maintenance, stock health and serious summer fires. All these must be overcome by the peat farmer. Peat development is costly and one must frequently wait long periods for eturns from the initial heavy expense. This article tells the story of how an enterprising outherner took up 360 acres at £3-17-6 an acre. It was all peat and nearly all in tall manuka. Today it produces 140 pounds of butterfat per acre, and is valued at from

£30 to £40 an acre. Wherever possible the peat was burned off after draining, and with adequate topdressing a good pasture was obtained in four to five years. Owing to uneven consolidation, ploughing-up later becomes necessary; and new pasture is sown after a preparatory crop of swedes. As with some other peat areas 'scouring' of young stock has been controlled by the use of copperised superphosphate. When so much is heard of the depopulation of the countryside it is of interest to record that this farm now supports five households.—L. W. McCaskill.

Agriculture in Nelson and Otago

The *New Zealand Journal of Agriculture* has in recent months included under the heading 'Farming in New Zealand' two articles describing agricultural production in the provincial districts. It is to be hoped that this regional treatment will be carried further until the whole of the Dominion has had similar treatment. In the January 1947 issue Mr. J. W. Woodcock explains how the surface configuration of Otago, the second largest province, is conducive to extensive rather than intensive farming. At the same time, however, Otago is one of the most diversely-farmed regions in New Zealand. We are told that Otago has 39 percent of the tussock land, 11½ percent of the sheep, only 2½ percent of the cattle and produces only 1½ percent of the cheese, and less than one percent of the butter. On the other hand, 14 percent of the small seeds, 26 percent of the stone fruit and 6 percent of the pip fruit come from the province. Dividing Otago into eight regions, Mr. Woodcock outlines the farming practices in each. Looking ahead he visualizes largely increased production on new irrigated areas in Central Otago, more intensive farming in the coastal districts of north Otago (producing early vegetables, poultry, and small seeds), the greater use of lime and fertilisers on the Clutha Downs and drainage in the Taieri and Clutha Delta districts (to enable dairying to be carried out on some 5,000 acres).

The second province to be treated in this fashion is Nelson (May 1947). Although some attention is given to the five other counties pride of place is given in this article to Waimea. Of a total of 984,000 acres only one fifth has been improved and this small area produces over 90 percent of the county's agricultural wealth. Only 75,000 acres are really good land; but this small area grows all the hops and tobacco produced in New Zealand as well as a large proportion of the tomatoes, early vegetables and fruit of many kinds. On the lower slopes of the Moutere Hills is grown most of the 1,115,000 bushels of fruit produced annually in Nelson, and similar poor gravelly country has proved a profitable location for the production of *Pinus radiata* timber. Full credit must be given to the work of the Cawthron Institute. The Nelson primary producer has been exceptionally fortunate in the guidance he has received from the institute's local studies of soils and fertilisers, of mineral deficiencies, insect problems, and fungus and virus diseases affecting fruit, hops, tobacco and market garden crops. The district is also fortunate in the services provided by the Department of Scientific and Industrial Research through its Entomology Division at Nelson, the Tobacco Research Station at Riwaka and the research orchard at Appleby. Present tendencies in Nelson appear to be for considerable areas of poor land to go out of production, but for the better land to be more intensively developed and cropped. With still further development, the supply of seasonal labour must become a serious problem. Already half of the requirements have to be recruited from outside the province.

—L. W. McCaskill.

South Island Agriculture, 1850-1890

The series of articles entitled 'Farming in New Zealand' in the *New Zealand Journal of Agriculture* has recently made a welcome reappearance. The first of recent additions to he series (December 1946) has the heading 'Subsistence Farming'. It was natural hat the pioneer settlers should practise subsistence farming. Transport facilities were almost non-existent, so that they often had to process their crops as well as grow hem. Mr. P. W. Smallfield, the author, traces the various influences (Maori, missionary, New Zealand Company, etc.,) which modified the original pattern. He pays tribute to Marsden as the real pioneer of European farming in New Zealand. Of special nterest to students of historical geography is the section dealing with early methods of converting bush to grass and to cultivation, in which it is demonstrated that what we are prone to call modern practice was well established in the 1850's.

Mr. B. E. King (in 'The Pastoral Age', March 1947) points out how the first ettlers, having failed to tame the vast forests of the North Island, turned almost eluctantly to the native pastures of the South Island as a source of immediate income. n the story of the settlement of the southern provinces, the names of our great sheepmen appear in their correct perspective as the initiators of new methods of stock management. After following the pioneers through their troubles with scab and abbits and the problems of fencing and waterrace construction, we find that the areas hat were easily converted into sheepfarms were fairly fully used by the late 1860's. About this time the decline in the price of sheep, though disastrous to the South Islander, enabled the North Island runholder to buy cheaply large mobs of sheep with which to trample fern and thus assist in the grassing of parts of Hawkes Bay and overty Bay. Gold created a good market for agricultural produce and led to the development of large-scale cereal production. The period ends in the collapse of a boom, but between 1855 and 1880 money was made from wool and gold and ereals that later formed the foundation on which the frozen meat and dairy industries were built. 'This foundation lay [also] in the land [opened] to settlement, the roads, bridges, railways, buildings and harbours which had been built, and not ast in the immigrants who had arrived.'

For a period in the 1870's and 1880's it appeared that large-scale wheat farming ight become a feature of the permanent farming pattern of Canterbury and North tago. In 'Cereal Production', April 1947, Mr. R. H. Scott traces the population anges which made wheat growing profitable, the changes in mechanisation which ade large-scale agriculture possible, and the stages by which the 'bonanza' farms of ch improvers as John Grigg of Longbeach, Duncan Cameron of Methven, Studholme ros. of Te Waimate and the New Zealand and Australian Land Co. were developed. is an exciting story of reaping machines, and wire-binders and later of twinenders, of double furrow ploughs, grain drills, and of paddocks of wheat of as much 1,500 acres in extent. But it is also a story of the gradual development of the family rm, later intensified by the invention of refrigeration. Refrigeration stimulated a mand for land by the man with little capital; and political action resulted in the eaking up of most of the large estates. 'Bonanza' wheat farms gave way to the aller mixed farming units that we know today. The 'strippers' were followed by 'farmers'; assisted by the availability of fertilisers, the rotation of crops and live ck, they gradually reversed the dominant trend—from fertility-depletion to tility-building.—L. W. McCaskill.

2. *In Overseas Journals . . .*

A Mid-Pacific Tidal Wave

THE TSUNAMI OF APRIL 1, 1946, IN THE HAWAIIAN ISLANDS: G. A. Macdonald, F. P. Shepard, and D. C. Cox, *Pacific Science*, Vol. 1, No. 1, Jan. 1947, pp. 21-37.

In view of the report of damage by a tidal wave (tsunami) this year at Gisborne and the prospect of damage and possibly loss of life from time to time from tsunamis either of local or foreign origin, the recently published study of the tsunami experienced last year in the Hawaiian Islands is of considerable interest. It is noted that in Hawaii the possibility of the arrival of destructive sea waves is envisaged not only from northern seismic regions but from South America also. The summary of the paper reads as follows: 'The tsunami which reached the shores of the Hawaiian Islands on April 1, 1946, was the most destructive in the history of the islands. Generated by a sudden shifting of the sea bottom on the northern slope of the Aleutian trough, the waves travelled southward to Hawaii with an average speed of 490 miles an hour, an average wave length of about 122 miles, and a height over the deep ocean of about 2 feet. Effects on Hawaiian shores varied greatly. Locally the water dashed more than 50 feet above sealevel and swept as much as half a mile inland. Elsewhere the rise in water level was very small, and waves were gentle. Property damage was heavy, but loss of life was moderate.

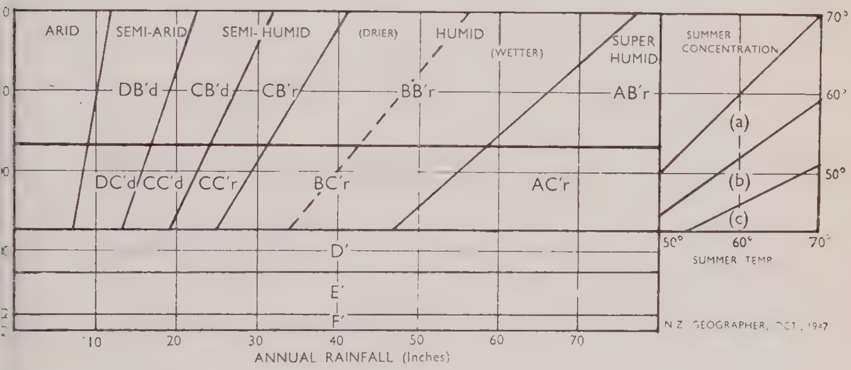
The heights and intensities of the waves at different points were influenced by position on the island toward or away from the source of the waves, offshore submarine topography, presence or absence of coral reefs, shoreline configuration, mutual reinforcement or interference by waves travelling different paths, and the presence or absence of storm waves. Loss of property during future tsunamis can be reduced by proper construction, by erection of sea walls, and by restricting or prohibiting construction in certain especially dangerous areas. Loss of life can be nearly or entirely eliminated by the establishment of a suitable system for warning of the approach of waves.'—C. A. Cotton.

New Zealand Climatic Regions

THE CLIMATES OF NEW ZEALAND: ACCORDING TO THORNTHWAITE'S CLASSIFICATION: B. J. Garnier, *Annals of the Association of American Geographers*, Vol. 36, No. 3, September, 1946, pp. 151-177. [Reprints of this article have been issued as the first Publication in Geography of Otago University where the author is head of the newly established Department of Geography.]

Most parts of New Zealand have a climate described as Cfb in Köppen's classification, and while this result may be satisfactory on a world scale it is inadequate for local requirements. Hence the author of the article under review has adopted Thornthwaite's system which divides New Zealand into seventeen different climatic types, twelve of which are major types. All twelve are represented in the South Island, but only seven are found in the North Island. P-E and T-E indices were computed from the records of sixty-six official climatological stations of the New Zealand Meteorological Services, and an appended table sets out precipitation and temperature means together with the corresponding ratios and indices for forty of these stations. Where necessary, reference has been made to additional rainfall figures as well as to published rainfall and temperature maps to procure sufficient data to enable the regional boundaries to be traced in some detail. While completeness is not claimed, extension of available basic data is unlikely to produce any serious change in the picture presented.

Mr. Garnier finds that $X = 115(P/T)^{\frac{10}{9}}$ provides a close approximation to the P-E index, P being annual rainfall in inches and T the annual temperature in degrees Fahrenheit. From computed examples he observes that microthermal climates have annual temperatures of 52.6° or less. The original definitions of the indices have apparently obscured the fact that the temperature subdivisions may be made directly from the annual temperature. Should, however, some months have means below 32°, the annual mean must be evaluated by substituting 32° for each such monthly temperature. The microthermal limit is precisely 53.3°.



With the proviso mentioned and adopting the X-values as being sufficiently reliable for practical purposes, the prescriptions for the twelve regions (depicted in terms of annual rainfall and temperature) are summarised here in simple graphical form. Reference to *s* and *w* subdivisions (rainfall deficient in summer or winter) can be omitted for New Zealand since rainfall is comparatively well distributed throughout the year.

The three cold regions are confined to mountainous areas. Below the region of perpetual snow and frost (F′), tundra conditions (E′) prevail down to 6,500 feet in the National Park region and down to 5,000 feet in the far south. Taiga (D′) climates extend lower down the mountain slopes to between 4,600 and 3,000 feet according to latitude.

Superhumid climates occur in parts of the Auckland and Coromandel Peninsulas, the central high country and main ranges of the North Island, along the western side of the South Island and fairly generally over the ranges of Nelson Province. With the exception of a restricted area from Napier and Waipawa, the remainder of the North Island experiences humid climates; and these are found also near Nelson, along the eastern slopes of the main southern ranges, as well as over much of Southland and about the Otago and Banks Peninsulas. The author advocates a subdivision into a 'drier' and 'wetter' humid climate by taking a P-E index of 90. (This is equivalent to the dotted line shown in the accompanying diagram.) Subhumid climates occur in the North Island only in the Hawkes Bay district mentioned above, but are prominent in the south extending over most of the Canterbury Plains, the upland Mackenzie Basin and southwards into northern and central Otago. In New Zealand's lowest rainfall area, which embraces Clyde and Alexandra, there is found a small region of semiarid conditions which approximates to Köppen's steppe climate (BSk′).

The article concludes with general comments on correlations with vegetation and soils and demonstrates several satisfactory features of this classification. As the Thornthwaite system was developed from North American data only, it is not to be expected that the boundaries will always be critical limits in other parts of the world. How adequate the system is for New Zealand will be largely determined by the future observations of various fieldworkers who will heartily welcome having available these maps which show the Dominion dissected into an intricate pattern according to a system of climatic classification which has gained universal recognition.—C. J. SEELYE.

GEOGRAPHY AND HISTORY

FIELD RESEARCH IN HISTORICAL GEOGRAPHY: A. H. Clark, *Professional Geographer*, Vol. 4, Dec. 1946, pp. 13-23.

HISTORICAL EXPLANATION OF LAND USE IN NEW ZEALAND: A. H. Clark, *Journal of Economic History*, Vol. 5, No. 2, Nov. 1945, pp. 215-230.

The following remarks are not intended as an orthodox review of Mr. Clark's two articles. They are rather the reflections of an historian after reading two very interesting essays by a geographer: one on geographical method, the other a specific study in which this method is applied to a problem in the economic history of New Zealand.

The first article has two principal points of interest for the historian. It offers in the first place a definition of the philosophical purpose of geographic studies. This at once suggests comparisons with history and indicates how closely history and geography are interrelated and how much their fields actually overlap. Secondly, it examines several of the practical problems that confront the student of geography when he sets about a piece of original field research, and shrewdly advises how they should be handled. The student of history, and I should imagine of economics too, meets the same sort of problem, and the methods of the geographer are almost exactly applicable.

It is not enough to take a narrowly utilitarian view of the purpose of geography, and to allow the subject to be treated as a mere handmaiden of the military scientist or the economist, supplying him with sundry handy techniques of analysis and particularly with the device of mapmaking. Geography has an intellectual purpose of its own. It is, says Mr. Clark, 'a discipline which practises the orderly study of the surface of the earth . . . and seeks to chart and explain the groupings and distributions of the material phenomena of the world'. It is necessarily based upon fieldwork, that is upon first-hand observation of the phenomena of the earth's surface, and it employs the map as the basic tool of the geographer. But to regard it as a sort of cataloguing or photographic process, a mere routine of ascertaining, recording and classifying relevant data, would be to miss its real purpose. The geographer must also explain the phenomena that he observes. 'A purposeful field study should differ from . . . an omnibus compilation just as an intelligently executed painting differs from a photograph.' Geography is an 'art'; the geographer is called upon to select his data, group together related items, and interpret the character and significance of what he sees in terms of cause and effect.

It is no accident that these remarks should have a very familiar ring in the ears of the historian. The purpose of history is closely comparable with that of geography. It might be described, paraphrasing Mr. Clark's words, as 'a discipline which practises the orderly study of the evolution of human society on the surface of the earth, and seeks to know and explain the behaviour of the social groups during the course of their development'. Geography necessarily treats of mankind, especially civilised mankind, as one of the very important 'material phenomena' which affect the surface of the earth. History necessarily takes account of the surface of the earth as the place on which mankind has principally existed, and by which his evolution has been in large measure conditioned. Each subject has its own identity of purpose: each has in some degree its own techniques: the content of the one is not completely identical with that of the other since there are some aspects of geography with which history is little or not at all concerned, just as there are some branches of history that are not relevant to the geographer. But wherever geography is concerned with 'human phenomena', and wherever history is concerned with the effects of man's physical environment, the two studies tend to merge and become in effect one study, requiring the joint skills of the historian and the geographer to accomplish adequately.

Nothing could demonstrate this more clearly than Mr. Clark's second article: The Historical Explanation of Land Use in New Zealand'. This is essentially a contribution, and a most useful one, to the economic history of New Zealand, as well as being an essay on the geography of the South Island. The ingredients of the study might indeed be separated; it might be suggested that Mr. Clark, as a geographer, is primarily interested in the land as it has been affected by man's use, whereas the economist would be more concerned with the material produce raised by man's efforts from the land, and the historian with the achievement of man in so using the land. But surely this is to draw distinctions that imply no real differences. It is evident that here the geographer, the historian and the economist are on common ground, tackling the same problems, using the same data and the same methods, and ideally they ought to reach the same conclusions. The distinction between the three subjects breaks down: the study requires a student who is master of the historical, economic, and geographic techniques.

Mr. Clark is well aware of this problem of multiple 'professional competence'. The geographer, he points out, may have to be trained not only in geomorphology, climatology, cartography and statistics, but also in botany, anthropology, the science of the soil, economics, geology, history and political science; he may require a supplementary knowledge of physiology, neurology, and the chemistry and physics of the human body; and so on. The range of his intellectual equipment must, indeed, be 'greater than that required in most other disciplines', for 'it is in the nature of things that the training of a geographer should normally be longer and more arduous than that of a geologist or an economist'. I am a little disposed to query this conclusion, and

I should certainly not dare to assert it as applicable to the economist or the historian. In any of the 'human studies' indeed, the same sort of omnicompetence may be required. In practice, this must often mean that the geographer, a historian, or whatever he primarily is, must have at least enough awareness of the content, techniques and potentialities of kindred 'disciplines' to know when he ought to call in the services of an expert and obtain the help of a colleague or of a team of specialist associates. Scientists appear to appreciate the need of this sort of collaboration better than 'Arts' men. Mr. Clark has many helpful comments to make on the practical planning of a piece of fieldwork and on the obstacles and pitfalls that beset the path of the research worker. They are too numerous to mention here, but may be warmly commended to the attention of the young investigator. His warning against letting preconceived ideas affect observation and selection of evidence is worth repetition. 'The poor observer finds it treacherously easy to see the things he wants to see.'

Mr. Clark is courageous in recommending early publication of results, even though they have to be labelled 'tentative conclusions'. There is, as he points out, a danger that a perfectionist policy will stultify itself by remaining unproductive: it is also true that the pretext of improving one's work sometimes serves as a cloak for laziness. The opposite danger of premature publication, however, has also to be guarded against. On the whole, the paucity of means of publication, the rigours of editorial selection, the criticism to which immature or defective published work will be exposed as well as the good sense of the author, may be taken as sufficient deterrents, and in any case it is better to err on the side of activity than of passivity.

Of the second article, it must suffice to observe that it criticises the facile generalisation that New Zealand agricultural methods have been derived principally from England, with modifications imposed by local conditions, and demonstrates how in many important respects sheepfarming and cattlefarming in New Zealand have been shaped by Australian influences. This essay touches only a part of the field covered by Mr. Clark's larger study, *The South Island of New Zealand: A Geographic Study* . . . . a dissertation presented in the University of California. The sample is of such excellent quality that one can only hope that the fuller work will soon be available in New Zealand.—J. RUTHERFORD.

REVIEWS

Phosphate and Other Islands

MID-PACIFIC OUTPOSTS. By Sir Albert Ellis, C.M.G. Auckland: Brown and Stewart Ltd., 1946, pp. 303.

Few people have had the opportunity of travelling so widely, so frequently and over such a long period in the wide expanse of the Pacific as has Sir Albert Ellis, New Zealand representative on the British Phosphate Commission; still fewer have the happy facility of being able to offer the reading public accounts of their experiences that are at once as colourful, reliable and readable and yet so unpretentious as those of the author of *Mid-Pacific Outposts*. This book is the third of a valuable series. In it Sir Albert Ellis is concerned primarily to describe the operations of the Nauru and Ocean Island Relief Expedition in September 1945 following the defeat and surrender of the Japanese. The author attended the surrender ceremonies in these islands, which he knows so well, as official New Zealand representative; but the journey took him to other parts of the vast area of the mid-Pacific, from Bougainville to Tarawa and from Tarawa to Fiji.

The report of the journey is full of interesting fact, forceful and effective narrative, and of valuable comment. The detailed factual account of Nauru under the heel of occupying Japanese forces, including the enforced changes in agricultural practice and in food habits, is a valuable statement on yet another epoch in the history of alien impact on the native peoples and native cultures of the Pacific. It is a simple yet impressive account: '. . . . between the machine-gun posts and the pillboxes . . . . the tank traps and the trenches there were pumkins; one could not possibly get away from them. Nauru was the world's record pumpkin patch. There were heaps of them for use; huts stacked full of them. I've never seen so many in my life.' Narrative is perhaps best represented in two chapters that record the experiences of two islanders during the Japanese occupation: of Nabetari from Nikunau and his seven month voyage in a flimsy canoe from Ocean Island to Ninigo in the Admiralty Group; and of Sergeant Major Manuela from Nanumea 'finest man I have met in the Pacific, white, brown or black'. Comment on the other hand is particularly apparent and of especial geographic value in the latter part of the book where four chapters are devoted to 'The Gilbertese', 'The Ellice Islanders', 'The Phoenix Group' and 'The Ocean Islanders', and where another four chapters are accorded to 'Phosphate Matters' and a most valuable assessment of the future of the phosphate industry.

Geographers will find both this and the earlier books of Sir Albert Ellis on the countless and diverse islands of the Pacific at once highly entertaining and of lasting worth. They furnish a wealth of information about a little known and little visited part of our 'near north'.

Glimpses of the Vast Pacific

FROM A SOUTH SEAS DIARY 1938-1942. By Sir Harry Luke. London: Nicholson and Watson, 1945, pp. 255.

THE BRITISH PACIFIC ISLANDS. By Sir Harry Luke. London: Oxford University Press, 1944, pp. 32.

During his four years of office as Governor of Fiji and High Commissioner for the Western Pacific the author made many journeys among the islands under his jurisdiction; eastwards to the Tonga group, northwards to the Phoenix and Gilbert Islands, and westwards to the Solomons and New Hebrides. Included in his tours were liaison visits to New Caledonia, to Nauru and to Pago-Pago; the whole involving some 40,000 miles of travel by sea and 14,000 miles by air.

To the geographer eager for information on the Pacific *From a South Seas Diary 1938-1942* contributes but little factual knowledge. Occasionally bare statements of fact appear; a paragraph on the size, population and exports of New Caledonia, a few lines in similar vein on Nauru and Ocean Island, and a note on Pitcairn. The main theme is the day to day life of a governor with its concomitant speeches, legislative assemblies and entertainments. Consequently the contribution to geography is limited and is valuable only in that it presents a background by describing the life and customs of the people. Even so, these are treated rather superficially, prominence being given to ritual dances and ceremonial. Meagre indeed is the reference to cultivation, except for asides on coconuts and copra, or to the communal life among Polynesians, Melanesians and Micronesians which would be of concern to the geographer—their reaction to their respective environments and to the advent of western civilisation.

On the other hand the diary makes pleasant reading despite its format. There is an interesting paragraph on the isolation of the 'closed' districts—away from the white man's world, but especially from the Polynesian world, where the natives 'have become tiny and almost fossilized fragments of a primitive proto-Polynesia'. Missionary activity, the incidence of white man's diseases, shell-money, whaling at Tonga, gold in the Solomons and Pacific Islands, pidgin English; all are mentioned, but the general impression gained from reading the book is one of stately progress, retinue and all, from place to place. The illustrations, covering 84 pages, tend to emphasise this, and contain little of essential geographic interest.

On the title page Sir Harry quotes Robert Louis Stevenson: 'To travel hopefully is a better thing than to arrive'. This book is indeed an account of hopeful travel.

By contrast the Oxford Pamphlet is detailed, and within the compass of its 32 pages and inside covers manages to convey all the facts contained in the diary, and more in addition. The term 'British' comprises all islands which are integral parts of the British Empire, mandated territories or protectorates.

The first part is general, dealing with the Pacific and the islands as a whole, the native races, the impact of the white man and the extent of British responsibilities. Then follow short accounts of Fiji, Tonga, the Solomons, the Gilbert and Ellice Islands, Pitcairn, the New Hebrides and the New Zealand Groups. The two remaining sections describe the medical services and the war effort of the Pacific Islanders.

Sir Harry writes as a former administrator, but does emphasise certain geographic facts. He points out the distinction between the low and high islands, how the former are relatively poor and life is 'a constant struggle with nature for bare existence', whereas in the latter 'nature has bestowed her gifts with a lavish hand', not only from the point of view of cultivation, but also in the matter of mineral resources. Nauru and Ocean Island he places in a category apart. The general aspects of trade and development are discussed in broad outline, together with the strategic value of the islands in peace and war and in air and sea travel.

The pamphlet, then, fulfils the purpose for which it was written: to demonstrate to the British people the value of these islands which appear so small in the vastness of the Pacific Ocean. Their resources, their potentialities, their past efforts and their unbounded loyalty deserve our notice and make them worthy of further study.

—J. W. Fox.

Apologia pro Sua Vita

THE GEOGRAPHER'S POINT OF VIEW: Inaugural Address, Auckland University College, 2 March 1946. By Kenneth B. Cumberland. Auckland: Whitcombe and Tombs, 1947, pp. 24.

The custom by which a newly appointed professor speaks publicly either about his subject as a whole, or about that part of it to which he has given special attention, is worthy of wider cultivation than has been given it in university colleges in New Zealand. The time may even come, as travel is quickened and cheapened, and we become less dependent on the outside world in filling university posts, when such addresses may play a part in choosing a new professor. Certainly it is important to be sure that he sees his subject with a fresh vision. The custom, even in its present more limited role, is of special interest and importance when a new discipline has achieved academic recognition, breaking through the walls, whether of principle or prejudice, by which a university sets limits to its own expansion. Dr. Cumberland's inaugural lecture at Auckland University College is hence of more than usual significance. Let it be said immediately that its content is fully worthy of its occasion. There need be no doubt either about 'the geographer's point of view', or about its relevance to education and to government.

Geography has been established as a full degree subject in the New Zealand University for just over a decade. In that time the number of its students has grown rapidly. It is satisfying a demand. I see no evidence that Dr. Cumberland regards this fact as justifying his subject in its claim to academic recognition at the highest level, and he is clearly right. His justification rests where it should rest, on the nature of the problems the geographer seeks to solve. In *Challenge to Education*, Professor Eric Ashby suggested these criteria for determining what subject or what parts of a subject should be taught at a University: 'If the subject lends itself to disinterested thinking; if generalisation can be extracted from it; if it can be advanced by research; if, in brief, it breeds ideas in the mind, then the subject is appropriate for a university. If, on the other hand, the subject borrows all its principles from an older study . . . . and does not lead to generalisation, then the subject is not a proper one for a university'. Dr. Cumberland faces the issue suggested in the last sentence squarely. For, he says, 'geography has a foot in every camp'. Herein lies its peculiar danger, that it should borrow everything and contribute nothing, that it should pretend to 'integrate' what cannot be integrated, that it should assemble a welter of facts and bring to their interpretation no characteristic hypotheses of its own. In refuting the view that geography is merely a combination of portions of specialist fields of study, he brings out clearly the nature of its characteristic hypotheses. 'It studies the "existence together" within a regional framework of the phenomena which other sciences seek to isolate and study separately'. This is well said; geography is not concerned to 'integrate' the abstractions which other sciences have been compelled to make in pursuing their own purposes; rather has it theories of its own to offer for testing, by observations which it may share with other sciences, and which are often provided by students of those other sciences. Geography is, in fact, a point of view. So are physics and chemistry, which are essentially collections of ways of thinking about matter.

Geography is closely linked to history. It was probably inevitable that it should pass through a period of 'environmentalism' in which the physical environment became *the* 'geographic factor'. But geographers, like historians (and physical scientists), have learned to be sceptical of simple explanations. Herein lies the hope for the future of the subject. Nothing dries up the progress of a science more quickly than the belief that its major problems are solved, that the clue to its problems has been found. On the other hand, nothing stimulates its progress more than fertility of ideas among its students, combined with ruthless weeding out of false ideas by reference to observations and experiments. Dr. Cumberland's remarks on New Zealand problems, brief as they necessarily are in this address, are full of suggestions which show that vigorous research in geography is likely to be a significant part of scientific work in the next few decades. The practical importance of this can hardly be overestimated. Now that geography is emancipated from environmentalism, through which it became, in Dr. Cumberland's words 'a field of study which required—even instructed—its students to discover causal relationships of a predetermined type', the way is clear for it to play its proper technological role. That role is to provide, from its tested theories, scientific predictions about the steps which must be taken if we wish to achieve certain results, for example, the prevention of soil erosion. That will be one main purpose of geography as a science, and it is to be contrasted with the role it might play as a social science (in a bad but commonly held sense), discovering alleged controls and influences of the 'geographic factor' in human affairs, and making prophecies of how those affairs must 'inevitably' develop. The hope that geography in New Zealand is to be scientific is happily being realised.

The claim that 'geography is neither exclusively a natural science, nor exclusively a social science' leads Dr. Cumberland to put forward a mild plea for its inclusion in the faculty of science. No quarrel can be sustained with the logic of his position. The difficulties, if they are not merely the creations of prejudice, are practical. University colleges which are inadequately staffed and flooded with part-time students find many difficulties with their timetables, difficulties which are accentuated by the requirements of students taking mixed degrees. Such difficulties, though real enough, should not be allowed to prevent necessary reforms.

Like many other specialists, Dr. Cumberland does not feel that the new post-primary school curriculum has furthered the cause of his subject in the schools by introducing, as 'Social Studies', a fusion of history and geography. I sympathise with him as I feel the same about 'General Science'. In such matters it is dangerous to assume that the specialist is always wrong, that he is blinded by his enthusiasm for his subject. Dare one risk the heretical view that the experts in education may sometimes go astray? The new deal in education has now been launched. The most its critics can hope for is that the common sense of the teachers who have to operate the plan will prevent the 'integration' of history and geography, and the consequent destruction of their essential values. Those who are fortunate enough to learn their subject in association with active researchers like Dr. Cumberland, will have too clear a vision of the values inherent in it to permit their being submerged in a morass of 'integration areas' to use the terminology of the Thomas Report (p. 26).

Nine years have passed since Dr. Cumberland came to New Zealand, a young graduate of London setting out on his voyage of teaching and research. Nine fruitful years they have been in both fields of endeavour. *The Geographer's Point of View* reveals the sources of his success. It leaves the reader with a feeling of confidence that under his guidance 'the new Department of Geography at Auckland University College . . . . . will not have been inaugurated in vain'.—H. N. PARTON.

STATE PLANNING

REPORT OF THE COMMISSIONER OF WORKS FOR THE PERIOD ENDED 31 March 1946. Wellington: New Zealand Ministry of Works, 1946, pp. 34.

The first report of the Commissioner of Works to Parliament is a publication of great interest in several ways. It gives an account of the war effort of New Zealand's constructional industries, and provides the first official survey of planning in this country. Much of its material is of great significance, and will fully repay close study.

Part I deals with the war period, and quotes impressive statistics of acres of ground levelled, cubic yards of material excavated, miles of roads, runways, ditches and drains laid down, buildings erected and money spent. Most striking is an estimate that the accommodation constructed (quite apart from actual defensive works), 'involved a programme equivalent to the building of seventeen new towns each with a population of some 10,000.' The report might well have pointed out that the intercensal increase in population (1936-45) amounted, by a strange coincidence, to 173,869.

The housing shortage is the first topic discussed in Part II, 'The Post-War Period'. Wartime construction practically exhausted reserves of building materials, and rigid control of distribution is still necessary. The Government is taking advantage of this position to put town and regional planning on a firm footing. In this respect the report claims that the methods of the Ministry of Works have been adopted 'only after a careful examination of the detailed procedures which have been used in [other] countries.' A point which seems to have been overlooked, however, is the substantial contributions made by the geographers of those countries, to the basic knowledge so essential to sound planning.

It is a matter for congratulation that the Ministry appreciates the need for thorough research, and has provided itself with 'the nucleus of an economic research staff.' But why should research be exclusively economic? The report draws an interesting distinction between 'economic planning' and 'physical planning', the latter presumably the prerogative of the engineer. The Ministry has undertaken the preparation of regional surveys, and the report says that 'plans will have to be adjusted as these surveys reveal evidence derived from a full study of natural resources.' If, however, these regional surveys are to be exclusively the work of economists and engineers, one may doubt whether they constitute the best factual basis for planning. It is to be hoped that the Ministry's planners will take notice of the regional survey work done in recent years by geographers in New Zealand, and that it might find use for the services and qualifications of geographers in both fulltime and parttime (consultative) capacities. It is of some interest that the Ministry of Town and Country Planning in London has 50-60 geographers on its research staff.

The report emphasises that the 'Ten Year Plans' announced by the Minister of Works last year are not hard and fast programmes to be followed at all costs. Rather they are summaries of all works proposed by government departments and local authorities, for execution within a ten year period. All proposals are examined in the light of available knowledge of the areas concerned, and local bodies, too, are required to examine them, to suggest improvements, and 'the order in which they consider works should be carried out.' Co-ordination between the various local authorities is secured through the Regional Planning Councils. These have a vital role to play both as channels of communication between the Ministry of Works and local interests, and as indicators of public opinion and reaction to government proposals. They should serve, too, as a means of co-ordinating research work being done locally, and contributing to the basic knowledge of the region.

With desirable priorities established, the plan becomes a programme, and while always open to revision as conditions change, it will serve as a guide in the budgeting of annual expenditure on public works. By this means it will be possible to implement another major point of policy outlined in the report. It is proposed to control the volume of work on planned projects with due regard to 'the stabilisation of the constructional industries as a whole and the provision at all times of a volume of work appropriate to the needs of an economy geared to full employment.'

The report mentions some 'directions of desirable adjustment' in planning. These are likely to meet the approval of most geographers. They include the reversal of the drift of population to the North Island and into the larger cities, the improvement of rural amenities and utilities, the decentralisation of industry and the checking of such abuses as ribbon development and 'the uncontrolled use of land without any regard to the serious consequences now becoming apparent in the form of accelerated erosion.' Broader economic issues, such as New Zealand's role in world economy, the proportions of primary to secondary industries, the proportions of the national income to be spent on consumer goods or devoted to the development of the nation's capital equipment, are matters to be decided on a national scale, and the decisions must rest ultimately with Parliament.

The 'project maps' published so far accompany the report in a separate folder, but the geographer in search of regional boundaries will not find them on these maps. Boundaries of 'areas of comprehensive notice' are shown but these are not necessarily coincident with the limits of the regions as understood by Regional Councils, or research workers, or as defined originally in the Town Planning Amendment Act of 1929. The comprehensive notice is a legal device to hold down land values in areas to be taken for proposed works. It may be that final delimitation of regional boundaries is yet to come, when research and discussion have revealed the true extent of community of interest.

Amongst the works proposed, 'over-riding priority' goes to the construction of hydroelectric power stations, since so many other forms of building, industry and communications are handicapped by the present shortage of electricity. The demand for housing is such that it is estimated that some 12,000 houses will have to be built each year until at least 1960. Schools, university colleges and hospitals also need extra accommodation urgently.

Part III of the Report deals with the reorganisation of administrative machinery and procedure made necessary by the creation of the Ministry of Works, with its new functions and far-reaching powers. Two bodies concerned with planning, the Organisation for National Development and the Town Planning Board, have been incorporated in the Planning Division of the Ministry of Works. An appendix discusses legal aspects of planning, outlining the relevant legislation of the past twenty years.

The report is a most useful statement of both fact and intention. Its condensed and pithy style makes it at times heavy reading. Those interested in the orderly development of the Dominion, however, will find well rewarded any extra effort thus demanded. New Zealand, the 'social laboratory of the world' as it has been called, is undertaking a new experiment, not this time exactly a pioneer in the field, but it is nevertheless safe to say that its progress will be watched with interest by observers in many lands.—J. S. Duncan.

A General School Geography

THE PATTERN OF HUMAN ACTIVITIES. By H. W. King. Sydney: Australasian Publishing Co. Pty. Ltd., 1946, pp. 539.

Mr. King, who is geography teacher at Canberra High School and part-time lecturer in Economic Geography at Canberra University College, has succeeded in producing something different in the way of textbooks. The main purpose of this new text is described in the preface as 'the presentation of a liberal course in regional geography to meet the needs of fourth and fifth year pupils in geography classes in secondary schools'. This purpose is fulfilled, not by a rigid following of any one of the generally accepted systems of regional division, but by selecting for detailed description areas representative of the major types of human activity.

That the author is a staunch advocate of the concept of regionalism, but his awareness of the pitfalls involved in the selection of the unit-area is attested by his opening chapter: 'The Regional Approach'. While using the term 'natural region', he indicates the essential difference between a region in which unity is based on physical characteristics, and the more realistic geographic region in which the outstanding unifying characteristic might be physical, biological, human or any combination of these. These types of region he refers to as generic regions and specific regions respectively. Of particular value to schools is the concluding section of this chapter in which the author stresses the value of the regional survey in the study of local geography, suggests methods for carrying out such a survey, and gives a typical questionnaire for the survey of a country district.

Chapter 2—'A Conspectus of Human Activities'—unfolds the general plan of the main section of the book, which is, by a series of regional samples, to trace the main features of the pattern of human activities, dealing first with the more primitive communities and the subsistence utilisations of land and resources, and leading on to a study of those regions in which commercial activities predominate and where there is a high standard of technological achievement. The following selection of titles from the twenty-two chapters indicates the wide range of studies: 'Tropical Regions', 'Oriental Subsistence Farming', 'Animal-Crop Associations', 'Plantation Farming', 'Exploitative and Technological Activities', 'The Soviet Union', 'Industrial Japan', 'The Chota Nagpur Industrial Region', 'Canberra and the A.C.T.'. We take 'Tropical Regions' as a sample. The chapter is divided into four sections, the first of which is a general survey of such areas, the nature of the environment, chief commodities entering into world trade, farming types and cultivation practices and the relative unimportance of animal husbandry. The Netherlands East Indies is then taken as an example of an old-settled tropical region in which there is a three-fold developmental emphasis on native agriculture, plantation agriculture and mining. Section C is a study of New Guinea, an example of a newly developing tropical region with an emphasis on mining and agriculture, while the final contrasting study is of tropical Australia—pasture and mining—and an example of commercial and exploitative utilisation.

A notable feature of the book is the very full bibliography to each chapter. The student is asked to regard the selected studies as types, and a very comprehensive reading list is provided to encourage him to seek further information about other examples. The author is to be complimented on the wide range of material included in these lists. Of particular interest to New Zealand readers will be the reference to the *New Zealand Geographer* and to articles by New Zealand geographers in the bibliographies to Chapter 1 and Chapter 4 respectively.

Each topic is well illustrated by statistics which are as uptodate as present world conditions will allow, and by copious maps and diagrams which are clear, bold, and not over-burdened with information. The one serious omission is a complete absence of photographs, the inclusion of which would have done much to humanise the regional studies. The book is nevertheless a useful contribution to the literature of geography and should give direction to sixth-form study in post-primary schools.

—F. R. G. Aitken.

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